

VOLUME I

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ENVIRONMENTAL IMPACT REPORT

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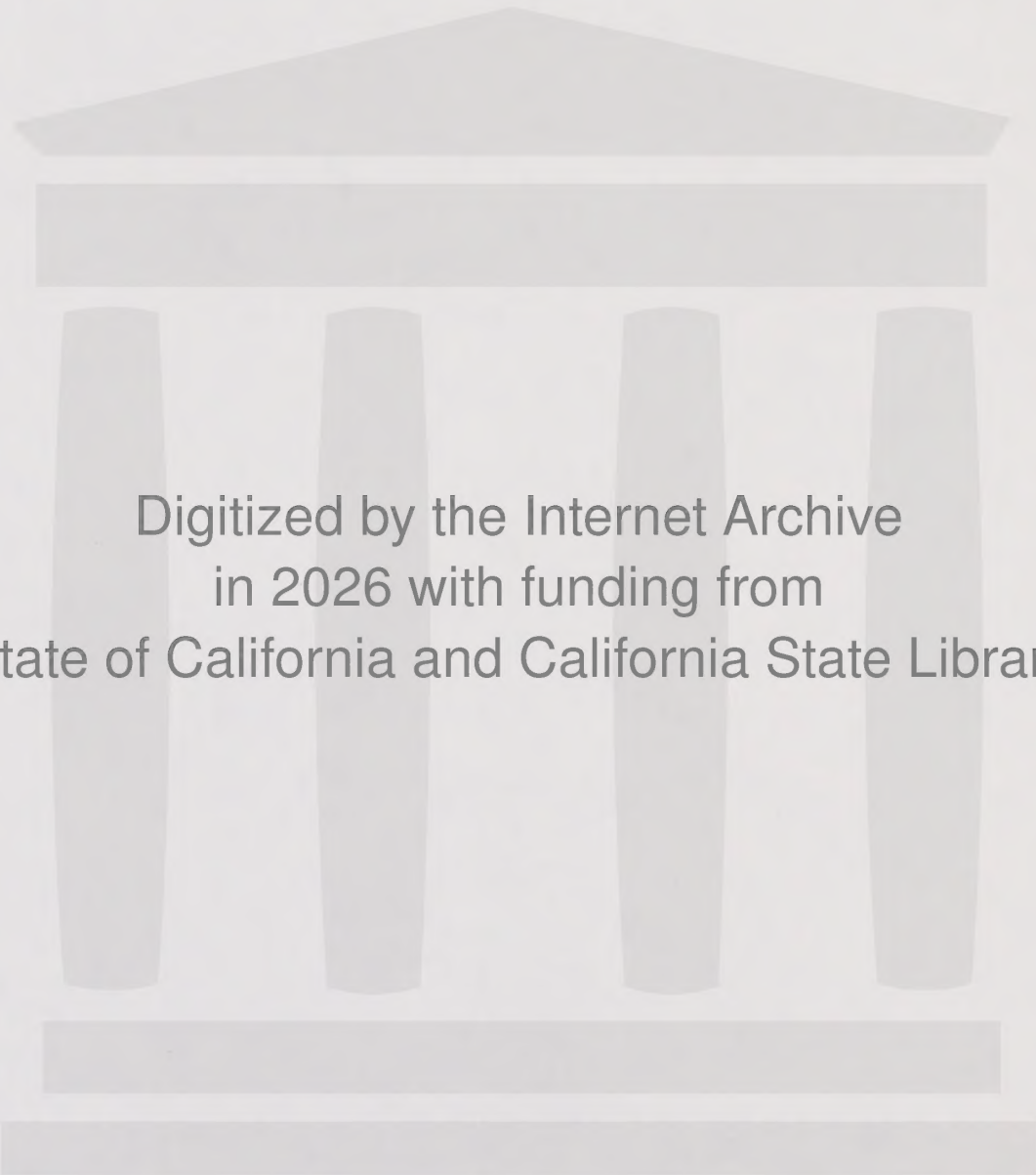
DRAFT ENVIRONMENTAL IMPACT REPORT

**CHIRON PILOT PLANT
EMERYVILLE, CALIFORNIA**

July 1989

State Clearinghouse No. 88010302

**Emeryville Planning Department
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1. INTRODUCTION

1.1 TYPE OF DOCUMENT

This Environmental Impact Report (EIR) has been prepared by the City of Emeryville in compliance with the California Environmental Quality Act (CEQA) of 1970, as amended. The EIR is complete in itself; although it refers to information contained in other environmental documents pertaining to the project area, its adequacy does not depend on any other document.

1.2 PROJECT UNDER REVIEW

The project under review is a pilot plant for small-scale manufacture of biotechnology products. Products needing testing prior to large-scale manufacturing would be made at this facility in quantities necessary to test them under the regulatory procedures of the Federal Food and Drug Administration (FDA). The Pilot Plant would also engage in initial and/or small volume commercial manufacture of materials incorporated in products approved for sale. The Chiron Corporation proposes to build and occupy the facility. The physical plant would consist of a two-story, steel frame structure, containing about 101,700 square feet with a maximum height of about 67 feet. The Pilot Plant would house manufacturing facilities for fermentation, recovery and purification of recombinant DNA-derived protein products, principally from yeast or mammalian cells, but also from bacteria. The facility would also include typical support laboratories (analytical and development), utilities, etc., associated with such an operation.

1.3 BACKGROUND TO PROJECT DEVELOPMENT

The Pilot Plant was originally proposed as an element of the Chiron Research and Development Park. This previous proposal consisted of three parcels which collectively contained a pilot plant and two office buildings. A Negative Declaration for the Park project was issued and adopted by the City of Emeryville in June, 1988. A Negative

Declaration is a document prepared pursuant to CEQA that determines that a project would not have a significant adverse effect on the environment.

Subsequent to this approval, a resident of Emeryville filed a lawsuit charging, in part, that the Park project should be the subject of an Environmental Impact Report (EIR).¹ The settlement reached on this case separated the original project into two distinct projects, each to undergo individual environmental review: 1) the Pilot Plant, the subject of this EIR, and 2) the office or office/hotel complex, now referred to as Shellmound Park. The settlement also stipulated that a Focused Environmental Impact Report should address the potential effects of the Pilot Plant, including analyses of:

- o accidental release of biological, chemical or radiological hazards;
- o air and water quality impacts;
- o hazardous or radiological materials use, storage and disposal;
- o sewage decontamination/treatment;
- o traffic impacts, and;
- o cumulative impacts.

The City of Emeryville and project sponsor have subsequently decided to prepare a full EIR for this project to satisfy all CEQA requirements, pursuant to Section 15161 of the CEQA Guidelines. A separate EIR is in preparation for the Shellmound Park portion of the original project.

1.4 PURPOSE OF THE ENVIRONMENTAL IMPACT REPORT (EIR)

The purpose of an EIR is to inform both decision makers and the public about the potential significant environmental effects of the project, to identify possible ways to minimize the potential significant effects, and to describe reasonable alternatives to the project. The Draft EIR has been prepared for review and comment by public agencies, interested organizations and the public. The City of Emeryville is the lead agency under CEQA for the environmental review.

Impacts described in this document are divided between "direct" and "cumulative" impacts. Direct impacts are defined as those impacts which are created by the project

itself, independent of surrounding development proposed for the area. Cumulative impacts are those impacts which are a result of the project in conjunction with other nearby development. Thus, the project is a contributor to cumulative impacts. The EIR also describes, where necessary, the "indirect" impacts of the project. Indirect impacts are those secondary "spin-off" effects which are created by the project's direct impacts.

After review by the City of Emeryville, the Draft Environmental Impact Report (DEIR) will be available for public review and comment for a period of at least 30 days. During this time a public hearing on the DEIR will be held by the City Planning Commission. At the completion of the public review period, a Response to Comments Document will be prepared containing responses to all oral comments made at the public hearing and all written comments received during the public review period.

The DEIR together with the Response to Comments document will comprise the Final Environmental Impact Report (FEIR). The FEIR will include mitigation measures designed to reduce the significance of the environmental impacts of the proposed project.

MITIGATION MONITORING

Assembly Bill 3180 (Cortese) was added to CEQA in 1988 and affects the environmental review and development approval process. It specifically addresses the need to develop a mitigation monitoring program as part of project approval. CEQA requires that EIRs identify mitigation measures to address significant environmental impacts identified in the EIR, and that the lead agency adopt findings that all identified significant impacts have either been mitigated are in another agency's jurisdiction and can and should be mitigated or are subject to overriding considerations created by other, beneficial characteristics of the project.

CEQA, however, does not specifically require adoption of measures to implement mitigation programs identified in an EIR. Under AB 3180 a lead agency must, in making findings identifying measures to minimize significant impacts of a project, adopt a reporting or monitoring program for each adopted or required mitigation measure.

After the preparation of findings and approval of the project, a lead agency must file a Notice of Determination with the County Clerk. The Notice of Determination is a formal legal notification of the approval of the project. The filing on this Notice starts a 30-day statute of limitations on court challenges to the approval of the project under CEQA.

1.5 REPORT ORGANIZATION

Chapter 1 of the report provides an introduction and overview of the Draft EIR and describes the environmental review process. The chapter also describes the organization of the report and the preparation of the Draft EIR and the Final EIR.

Chapter 2 provides a summary of the Draft EIR and identifies areas of potential significant impact. Chapter 2 also identifies mitigation measures to minimize or reduce potential impacts. A summary of potential environmental impacts and mitigation measures is presented in tabular form. Four categories of impact are noted in this chapter: A) Unavoidable Significant Adverse Impacts; B) Significant Impacts which can be Mitigated to a Less Than Significant Level; C) Impacts Not Considered Significant; and D) Beneficial Impacts.

Chapter 3 provides background information on the proposed project and describes the project's objectives. Site-specific characteristics and required permits and approvals are noted.

Chapter 4 discusses the potential environmental effects of the proposed project. Individual sections follow a standard format. The environmental setting of the project is followed by a discussion of potential significant environmental impacts and mitigation measures to reduce the effects to less than significant levels.

Chapter 5 discusses the cumulative impacts that may result from development of the proposed project and other existing and planned biotechnology projects within Emeryville, Berkeley, and Oakland. This section contains a summary of issues extrapolated from the individual sections in Chapter 4. This chapter also discusses the potential for growth inducement which the project may have, as required by CEQA, and notes significant unavoidable adverse impacts.

Chapter 6 discusses alternatives to the development of the proposed project. Four project alternatives are discussed in this chapter: a "No Project" alternative; a full buildout alternative, in which the Pilot Plant would be developed to the full floor area ratio (FAR) potential of the site; an alternative site use in which an office building would be developed to the same square footage as the proposed plant; and alternative site location for the project. This alternative discussed the siting process that was conducted for the facility and examines the development of the proposed project on a site in the City of Alameda.

Chapter 7 provides information regarding authors of the EIR and Chapter 8 lists organizations and persons consulted during the preparation of this report. Documents reviewed in the course of preparing the EIR are also noted in this section. Chapter 9 contains the Bibliography.

A separate volume containing technical appendices accompanies this Draft EIR. The Appendices contain public information documents relating to the project and other related information. The Initial Study for the project, along with the Notice of Preparation, is contained in Appendix A. Appendix B contains a transportation study which analyzes the impacts of both the Pilot Plant and Shellmound Park projects. A background report on biotechnology is contained in Appendix C, and a background report on Chemical and Radiological Materials is contained in Appendix D. Appendix E discusses archaeological resources in the Temescal Creek area of Emeryville. An environmental risk assessment examining potentially contaminated soils on the site is contained in Appendix F.

¹Stuart Flashman vs. the City of Emeryville, et al., Superior Court of the State of California, County of Alameda, Case No. 64115-0.

2. SUMMARY

This chapter presents a summary of the proposed project and potential environmental impacts that could be generated by the project, as well as ways of mitigating those impacts. This chapter also notes significant unavoidable impacts, cumulative impacts and alternatives to the proposed project.

PROJECT DESCRIPTION

The project under review is the development of a pilot manufacturing plant of biotechnology products. This facility would make clinical-trial and small-volume commercial quantities of a variety of biotechnology products for which Chiron Corporation is developing production processes. The development of biotechnology products is accomplished by fermentation and/or cell culture processes using a variety of yeast, mammalian or bacterial cells and employing recombinant-DNA techniques as a means to produce large quantities of a desired, but otherwise unobtainable, product.

The 2.6-acre project site is located on Shellmound Street in the City of Emeryville, Alameda County. The site is currently vacant and is surrounded by industrial and commercial land uses.

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Table 2-1 summarizes the impacts and mitigation measures outlined in detail in Chapter 4, Environmental Setting, Impacts and Mitigation Measures, of this report. Table 2-1 includes four categories of impacts: A) Unavoidable Significant Adverse Impacts; B) Significant Impacts Which Can Be Mitigated to a Less Than Significant Level; C) Non-significant Impacts; and D) Beneficial Impacts. Each of these categories follows a standard tabular format that contains: environmental issues reviewed in the EIR; potential impacts which would be generated by the project; proposed mitigation measures; and an indication whether the mitigation measures are proposed as part of the project or proposed by the EIR consultants.

TABLE 2-1
SUMMARY OF IMPACTS AND MITIGATION MEASURES

A. UNAVOIDABLE ADVERSE IMPACTS

Environmental Issue	Impact	Mitigation Measures	
		Proposed As Part Of Project	Other
4.3 <u>Transportation</u>	1. Increase of 200 daily trips, including 40 a.m. peak hour and 35 p.m. peak hour. With or without the proposed project, the Levels of Service (LOS) at three intersections on Powell St. would drop below LOS D, because of cumulative development, which is planned in Emeryville. The proposed project would contribute to this cumulative impact.	1. Implementation of a Transportation System Management (TSM) Program.	1. Caltrans plans to modify the I-80/Powell St. interchange by 1991-93. These modifications would restore Levels of Service along Powell St. to LOS D or better. Implementation of intersection geometric and traffic signal timing improvements, as recommended in Section 4.2, would improve Levels of Service prior to the Caltrans improvements. 2. Restriping of the center lane of the northbound I-80 offramp onto Powell Street to allow both right and left turns from this lane. (Caltrans has completed this restriping.) 3. Addition of a southbound "free" right turn lane at the Powell/Christie intersection. 4. Addition of a westbound right turn lane from Powell Street onto the I-80 entrance ramp.

TABLE 2-1 (Continued)

A. UNAVOIDABLE ADVERSE IMPACTS

Environmental Issue	Impact	Mitigation Measures	
		Proposed As Part Of Project	Other
4.3 <u>Transportation</u> (continued)			5. Addition of a southbound left turn from Frontage Road onto Powell Street. NOTE: Mitigation measures 3 through 5 would be the responsibility of the City of Emeryville and property owners, through an Assessment District. Also, these would be subject to Caltrans' approval. 6. Retiming of the traffic signals along Powell Street at the I-80 ramps and Frontage Road. 7. Construction of street extensions for Shellmound and Bay Streets by the City of Emeryville.
4.5 <u>Air Quality</u>	1. Increase in carbon monoxide levels at nearby intersections.	1. Implementation of a Transportation System Management (TSM) Program.	1. Implementation of traffic mitigation measures as described above.

TABLE 2-1 (Continued)

B. SIGNIFICANT IMPACTS WHICH CAN BE MITIGATED TO A LESS THAN SIGNIFICANT LEVEL

Environmental Issue	Impact	Mitigation Measures	
		Proposed As Part Of Project	Other
4.2 <u>Public Health</u>	1. Potential risk to health and safety resulting from the use of biological agents at the Pilot Plant.	1. No infectious agents or biohazardous materials would be allowed at the plant. Yeast and bacterial strains allowed at the plant would require specific nutrient supplements to survive. Separate ventilation systems for work areas with high efficiency particulate air (HEPA) filters. Use pharmaceutical grade fermenters and closed systems to contain the process and protect workers and isolate the product. Provide containment of dikes to control liquid spills. Use machinery parts and maintenance programs mandated by the U.S. Food and Drug Administration (FDA). Conduct work with cells in compliance with National Institutes of Health guidelines, even though they are no longer required for these specific organisms.	

B. SIGNIFICANT IMPACTS WHICH CAN BE MITIGATED TO A LESS THAN SIGNIFICANT LEVEL

<u>Environmental Issue</u>	<u>Impact</u>	<u>Mitigation Measures</u>	
		<u>Proposed As Part Of Project</u>	<u>Other</u>
4.2 <u>Public Health</u> (continued)		The Chiron Biosafety Committee would be charged with establishing policies and guidelines to ensure that manufacturing activities are conducted safely and comply with all FDA regulations.	
	2. Potential exposure of workers to hazardous chemicals or radioactive materials.	2. Provide employee safety training programs and sound operating procedures.	
	3. Potential hazard due to the comingling of acid and caustic liquids due to rupture of tanks in the event of an upset or earthquake.		3. Increase the distance between the tanks and construct separate containment for each tank to provide additional separation between acids, bases and solvents.
	4. Potential hazards due to fires, explosions or sudden release of hazardous materials to the air, soil or water.	4. Design Contingency Plan to minimize potential hazards to human health in the event of an accident.	
	5. Hazardous metals may be present in significant concentrations in soils at the project site.	5. Implement recommendations of the Alameda County Department of Environmental Health regarding contaminated soils.	
	Excavated soils could present a hazard of exposure to workers and the surrounding community during construction.		
	6. Potentially contaminated groundwater may be brought to the surface if construction activities include dewatering.	6. Adopt Regional Water Quality Control Board standards for handling and treating hazardous water prior to discharge.	

B. SIGNIFICANT IMPACTS WHICH CAN BE MITIGATED TO A LESS THAN SIGNIFICANT LEVEL

<u>Environmental Issue</u>	<u>Impact</u>	<u>Mitigation Measures</u>	
		<u>Proposed As Part Of Project</u>	<u>Other</u>
4.4 <u>Noise</u>	1. Pilot Plant exposed to noise from Highway 80.	1. Insulate building from traffic noise.	
4.5 <u>Air Quality</u>	1. Temporary increase in dust during construction period.	1. Implement dust suppression measures. Water down construction site in late morning and at the end of the day. Daily clean-up of mud and dust carried onto surface streets from construction vehicles. Haul trucks would use tarpaulins or other effective covers.	

B. SIGNIFICANT IMPACTS WHICH CAN BE MITIGATED TO A LESS THAN SIGNIFICANT LEVEL

Environmental Issue	Impact	Mitigation Measures	
		Proposed As Part Of Project	Other
4.7 <u>Hydrology and Water Quality</u>	1. Possible flooding due to unlikely event of Lake Temescal dam failure.		1. Ensuring the structural integrity of the dam on Lake Temescal is beyond the authority of project sponsors, however, by State Law, the dam must meet or exceed requirements of the California Department of Water Resources, Division of Dam Safety.
4.8 <u>Geology, Soils and Seismicity</u>	1. Severe earthquake-induced groundshaking could harm pilot plant employees.	1. Obtain building permits prior to beginning construction or site preparation. Prepare the site grading, foundations and structures in accordance with recommendations from a site-specific geotechnical study prepared by a California Certified Engineering Geologist. Use a deep pile or drilled pier foundation for multi-storied structures. Remove or recompact subsoils as needed for support of light structures and parking areas. Comply with Uniform Building Code Standards for Seismic Zone 4.	
	2. Liquefiable soils or fill may be present on-site and could damage foundations through settlement of compressible sediments.	2. See previous mitigation measures.	

TABLE 2-1 (Continued)

B. SIGNIFICANT IMPACTS WHICH CAN BE MITIGATED TO A LESS THAN SIGNIFICANT LEVEL

Environmental Issue	Impact	Mitigation Measures	
		Proposed As Part Of Project	Other
4.8 <u>Geology, Soils and Seismicity</u> (continued)	3. Erosion rates and sediment transport generated by equipment used to prepare the site and construct the project may increase during construction periods causing an increase sediment load to enter Temescal Creek.	3. See previous mitigation measures.	3. Prepare an erosion and sediment transport control plan for the site that follows the guidelines of the Alameda County Water Conservation and Flood Control District.
4.9 <u>Vegetation and Wildlife</u>	1. Erosion and uncontrolled runoff from the site could lead to sedimentation in the creek and bay.		1. Erosion from the site and sedimentation into the creek should be controlled. Construction should be undertaken during the dry season. Other methods for controlling erosion and sedimentation are recommended under the Hydrology section.
	2. Direct drainage from the developed site may introduce urban pollutants into the creek and downstream habitats.		2. Drainage from the site should be filtered and/or retained as recommended under the Hydrology section to prevent degradation of water quality in the creek and downstream in San Francisco Bay.
4.11 <u>Cultural and Historical Resources</u>	1. Possible, although unlikely, disturbance of the Emeryville Shellmound.	1. If human bones, bone fragments, or other cultural artifacts are found, excavation in the vicinity would be stopped, and an archaeologist would evaluate the find and follow procedures described in Section 4.3.	

TABLE 2-1 (Continued)

B. SIGNIFICANT IMPACTS WHICH CAN BE MITIGATED TO A LESS THAN SIGNIFICANT LEVEL

Environmental Issue	Impact	Mitigation Measures	
		Proposed As Part Of Project	Other
4.13 <u>Public Services and Utilities</u>			
o Fire	1. Increased demand for fire protection in Emeryville.	1. Comply with all Fire Department regulations. Incorporate agreements between the project applicant and Fire Department regarding access routes, spacing of fire hydrants, and presource requirements. Standpipes for connection to fire hoses must be located in all stairwells in the project.	
o Police	1. Increased demand for police protection in Emeryville.	1. Comply with all Police Department regulations. Department should review all security hardware, exterior lighting, and alarm systems installed at the project.	
o Sewage Systems	1. Increased demand for storm sewer services in Emeryville.	1. Project applicant would be responsible for upgrading storm drains for connection to City system.	

TABLE 2-1 (Continued)

C. IMPACTS NOT CONSIDERED SIGNIFICANT

Environmental Issue	Impact	Mitigation Measures	
		Proposed As Part Of Project	Other
4.3 <u>Transportation</u>	1. Increase in riders on public transit in the vicinity of the project. 2. Increase in project-related traffic near pedestrian and bicycle lanes in the vicinity of the project.		1. None required. 2. None required.
4.4 <u>Noise</u>	1. Construction noise.		1. None required.
4.5 <u>Air Quality</u>	1. Increase in emissions from vehicles/equipment during construction.		1. None required.
4.6 <u>Wastewater Treatment and Discharge</u>	1. Potential impacts to the wastewater treatment plant from improperly pretreated discharge.	1. Obtain a discharge permit from EBMUD and verify adequate pretreatment of discharges.	
4.7 <u>Hydrology and Water Quality</u>	1. Increased stormwater runoff. 2. Minor degradation of water quality in Temescal Creek and the Emeryville Crescent.		1. None required. 2. None required.
4.12 <u>Population, Employment and Housing</u>	1. Increase of 82 new households. 2. Increase of 197 persons in the North County subarea.		1. None required. 2. None required.

TABLE 2-1 (Continued)

C. IMPACTS NOT CONSIDERED SIGNIFICANT

<u>Environmental Issue</u>	<u>Impact</u>	<u>Mitigation Measures</u>	
		<u>Proposed As Part Of Project</u>	<u>Other</u>
4.13 <u>Public Services and Utilities</u>			
o Schools	1. Increase of 6 students in the Emeryville Unified School District system.		1. None required.

TABLE 2-1 (Continued)

D. BENEFICIAL IMPACTS

<u>Environmental Issue</u>	<u>Impact</u>	<u>Mitigation Measures</u>	
		<u>Proposed As Part Of Project</u>	<u>Other</u>
<u>Visual Quality and Aesthetics</u>	1. Project would change existing visual character of the blighted industrial site.	1. Cohesive design and siting of buildings and provision of landscaping would improve the visual character of the area.	
<u>Vegetation and Wildlife</u>	1. Landscape trees, shrubs and groundcover would provide habitat for urban birds, small mammals and reptiles.		1. None required.
<u>Population, Employment and Housing</u>	1. Increase of 82 jobs.		1. None required.

CEQA CONSIDERATIONS

Cumulative Impacts

Public Health. This report concludes that the biotechnology aspects of the Chiron Pilot Plant, operating in accordance with State and federal regulations, would not have a cumulative significant adverse impact on public health or the environment. Thus, the effect of this facility added to the effects of similar activities at other biotechnology facilities would not result in significant cumulative public health or environmental effects during normal operation.

The concentration of several biotechnology facilities in a given area would increase the probability of a biotechnology accident in that area. In the case of the Chiron Pilot Plant, however, the nature of the biotechnology materials used (yeast, bacteria and mammalian cells) is such that the consequences of an accident would not be severe and would not pose a significant threat to public health or the environment.

Transportation. Cumulative traffic impacts resulting from existing and reasonably foreseeable future projects could also occur in the project area. A list of projects included in calculations conducted to determine the level of this impact are presented in Section 4.3, Transportation. The resulting cumulative traffic impacts would be significant, even with appropriate mitigation measures.

Air Quality and Noise. The increase in travel generated by the proposed project in combination with additional developments in the area would result in deterioration in air quality due to traffic-related carbon monoxide emissions. The air quality impacts would be significant and unavoidable. Noise levels would increase during construction.

Population, Employment and Housing. The increase in employment at the project site would have an indirect impact on housing demand in Emeryville. Cumulative effects on housing and employment would be less than significant.

Public Services and Utilities. The increase in employees at the project site would add to the demand for public services and utilities in Emeryville.

Growth-inducing Impacts

The proposed pilot manufacturing plant is not expected to contribute significantly to commercial or retail growth in the area. An estimated 82 employees of the facility would not induce growth in any major sector of the economy to a significant extent.

Significant Unavoidable Adverse Impacts

Traffic and air quality impacts of the project would be unavoidable. Mitigation measures presented in Chapter 4 could mitigate all the other direct significant impacts to non-significant levels.

The cumulative traffic impacts of this project and other reasonably foreseeable projects in the area would affect traffic flow and reduce the Level of Service (LOS) at neighboring intersections, as discussed in Section 4.3, Transportation.

It would not be feasible to mitigate all of the significant cumulative impacts on the levels of carbon monoxide due to increased traffic which would result from planned growth in Emeryville to less than significant levels and, therefore, this cumulative air quality impact would be unavoidable.

PROJECT ALTERNATIVES

Alternatives to the proposed pilot manufacturing plant include: a No Project Alternative; a Full Buildout Alternative with development of a Pilot Plant which uses the maximum allowable building envelope under current zoning requirements; Alternative Site Locations; and an Office Building Alternative.

No Project Alternative

The no project alternative would forgo all environmental impacts of the proposed Pilot Plant. However, this alternative would also not satisfy the goal of the project sponsor, which is to develop a Pilot Plant in proximity to the existing Chiron facilities in Emeryville.

Full Buildout Alternative

The Full Buildout Alternative would result in development of a larger facility on the site. The zoning ordinance allows for a building of up to 87,800 square feet greater than that of

the proposed Pilot Plant. This would increase the number of employees, the use of hazardous chemicals, and the level of traffic and air quality impacts from the proposed Pilot Plant.

Alternative Site Locations

Several alternative site locations were reviewed by the project sponsor prior to selection of the proposed project site. Of the sites considered, the Marina Village alternative was the second choice to the proposed site. The Marina Village site would have approximately the same level of environmental impacts as the proposed site. The Marina Village alternative site is more remote from Chiron's existing operations in Emeryville and would therefore not satisfy the project sponsor's goals for proximity of the two facilities as well as the proposed site.

Office Building Alternative

The alternative which would use the site for an office building instead of the Pilot Plant would involve a larger number of employees. This would increase the number of traffic trips adding to the projected direct and cumulative traffic impacts and associated air quality impacts. This use of the project site would not satisfy the project sponsor's goal for development of a pilot manufacturing plant in the vicinity of the existing Chiron facility.

3. PROJECT DESCRIPTION

The proposed project is the construction and operation of a Pilot Plant for Chiron Corporation, a biotechnology manufacturing company. This facility would make clinical-trial and small-volume commercial quantities of various biotechnology products for which Chiron would develop a full-scale production process at a location other than the Pilot Plant.

Chiron Corporation applies genetic engineering and other techniques of modern biology to the development of health care products. The company's research is focused in four areas: hormones and growth factors, therapeutic enzymes, vaccines, and related diagnostics. The company has facilities located in Manteca, California, for intermediate to large-scale (18,000 liters) production of biotechnology products and two office-laboratory buildings in Emeryville which house small-scale production, research and development, and administration facilities. In addition, Chiron Ophthalmics, essentially a wholly owned subsidiary, employs some 45 people in Irvine, California, with sales representatives in a number of cities across the country.

3.1 OBJECTIVES OF THE PROJECT SPONSOR

The objectives of the project sponsor include building a Pilot Plant in close proximity to the Emeryville Chiron offices. This objective was an overriding concern. The project sponsor anticipates close interaction between the functions and personnel of the Pilot Plant and Chiron's other facilities located in Emeryville and Manteca.

The purpose of the proposed plant is to produce multiple products in quantities sufficient for clinical trials and early production. At the same time, the staff would examine a particular production process and develop it up to the point where efficient large-scale production operations would be designed and another facility built specifically for that

product. The principal concept of the Pilot Plant is, therefore, flexibility. Chiron wishes to produce a wide range of products for the pharmaceutical industry, using processes not yet fully developed. These processes would be refined at the Pilot Plant prior to large-scale production at a full-scale plant elsewhere.

Pilot Plant product development activity would focus on optimization of processes used to create biotechnology products as well as optimization of the products themselves. The plant is designed to develop products to the point where large-scale production is feasible.

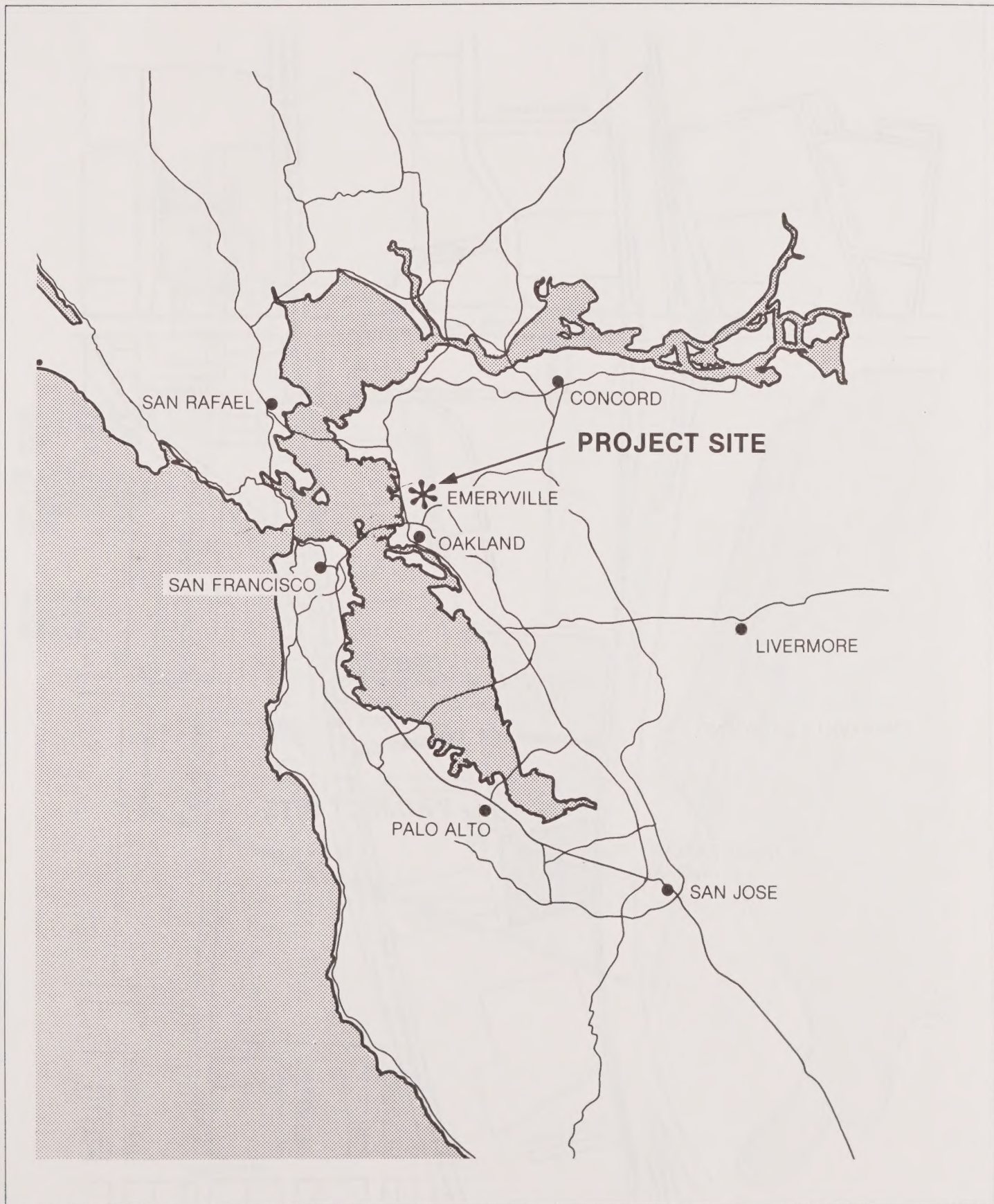
3.2 PROJECT LOCATION

The 2.6 acre project site, assessor's number is 49-1516-7, is located at 4515 Shellmound Street in the City of Emeryville, Alameda County (see Figure 3-1, Regional Location Map, and Figure 3-2, Site Location Map). Currently the site is vacant except for miscellaneous building foundations and fencing, and abandoned railroad tracks. These site features would be cleared as part of project development prior to construction.

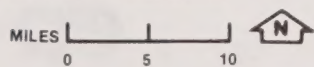
Shellmound Street defines the site's eastern edge and a 30-foot wide Caltrans easement forms the western boundary of the site where it abuts Highway 80, the Eastshore Freeway (Figure 3-3). To the north of the project site is a parcel of land proposed for development of the Shellmound Park complex. The Shellmound Park proposal is not part of the project under review in this document. A separate EIR is currently being prepared for the Shellmound Park development.

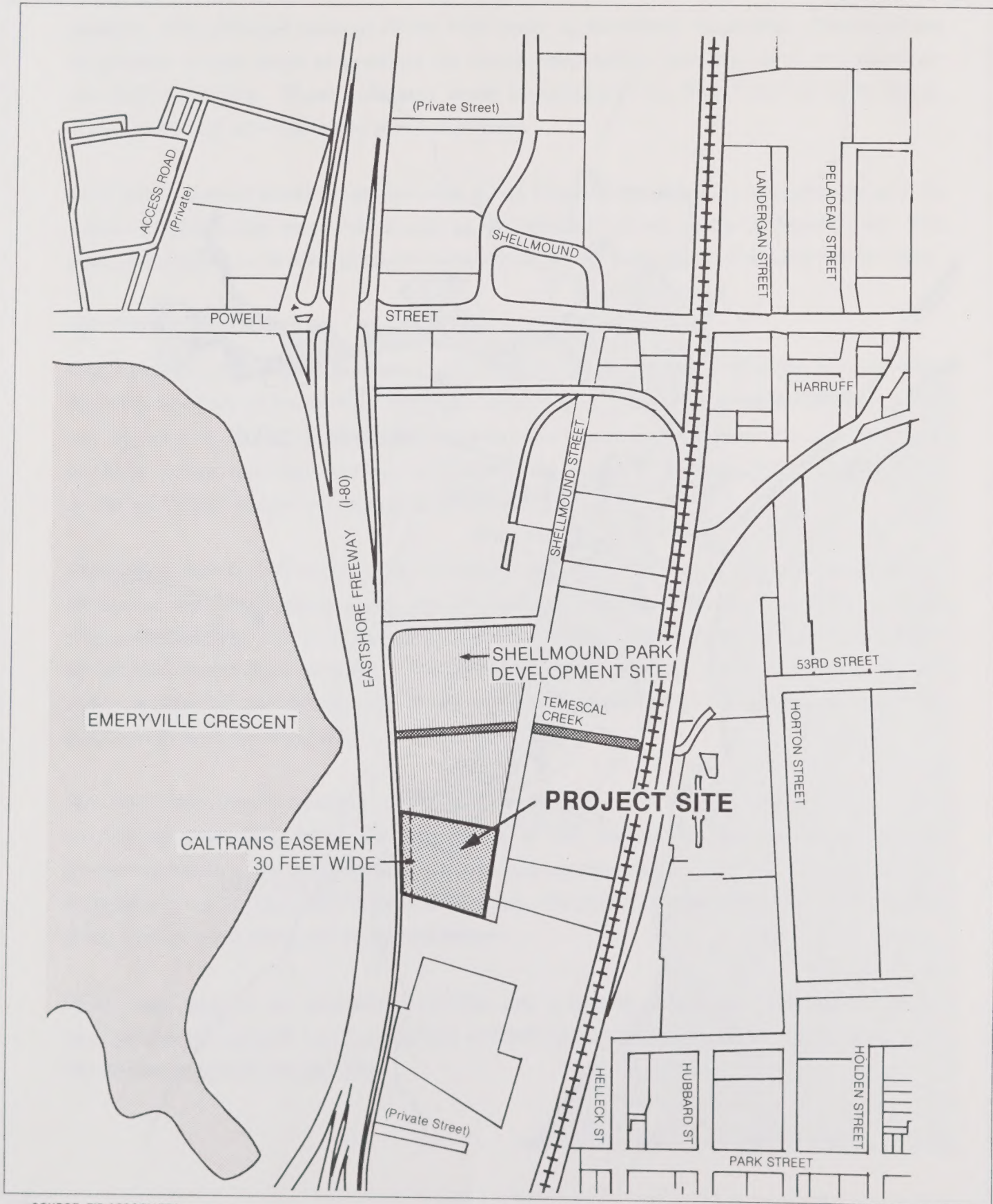
The Pilot Plant site is bounded on the south by Barbary Coast Steel, which manufactures reinforcing steel in a "mini-mill" consisting of two warehouse-type buildings. Across Shellmound Street, Myers Container Corporation operates a drum reconditioning business on property leased from the Pfizer Corporation. Its facility includes an outdoor 55-gallon drum storage yard and a one-story warehouse.

Other land uses in the immediate vicinity are primarily industrial. There is a newly developed retail area at the intersection of Shellmound and Powell Streets to the north of the Shellmound Park project site.



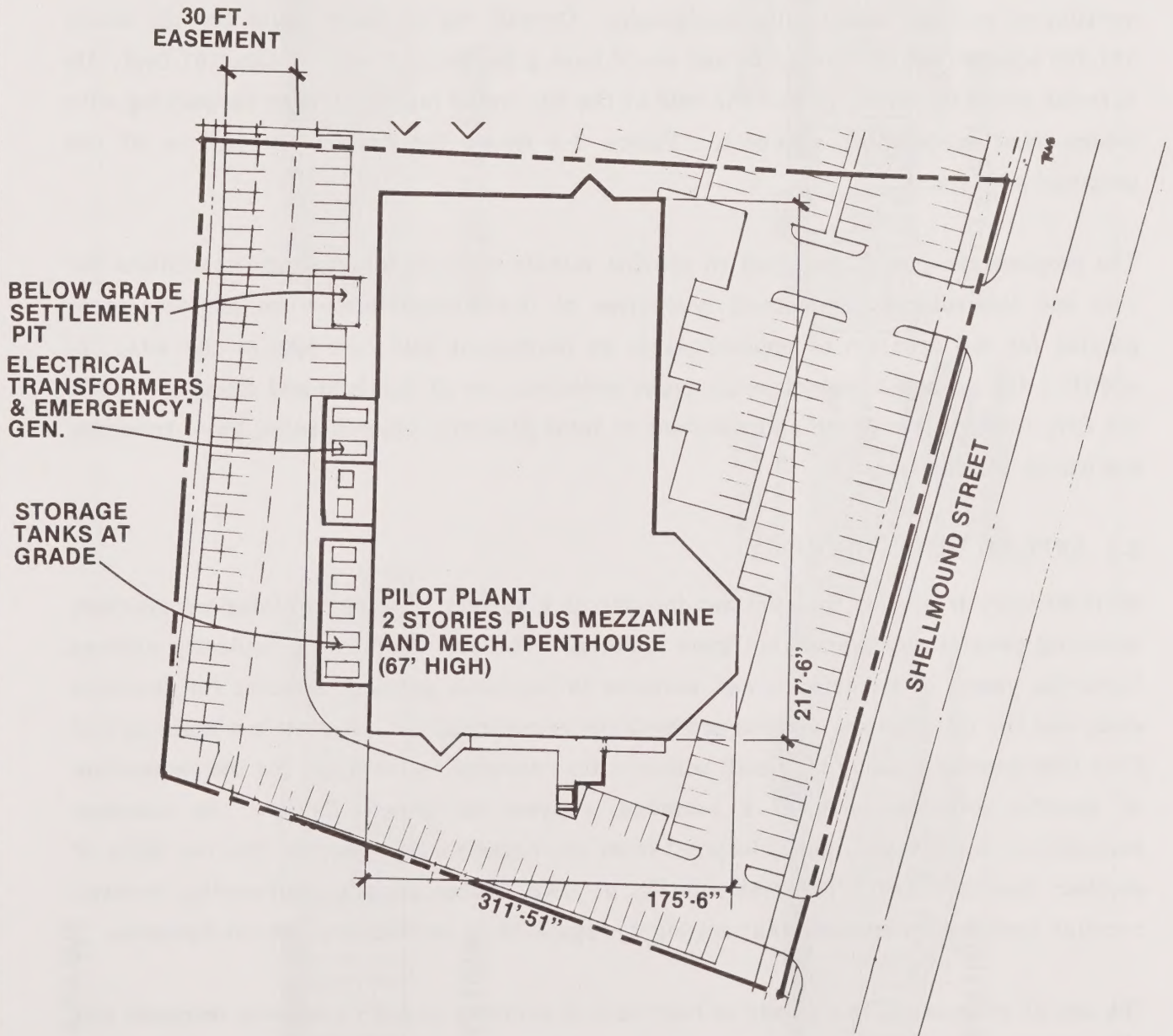
SOURCE: EIP ASSOCIATES





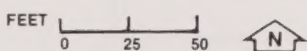
SOURCE: EIP ASSOCIATES

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SOURCE: HELLER & LEAKE ARCHITECTS

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3.3 PROJECT CHARACTERISTICS

The proposed Pilot Plant would house the personnel and equipment necessary for small-scale product processing in a steel frame structure ranging from two to three-stories. The building would contain a mezzanine and a mechanical penthouse containing heating, ventilating and air conditioning equipment. Overall the building would contain about 101,700 square feet of floor space and would have a maximum height of about 67 feet. Its exterior would be mainly glass. The bulk of the site would mainly be used for parking with interspersed landscaping elements. Figure 3-4 shows the building elevations of the proposed pilot plant.

The proposed project is designed to provide biotechnical manufacturing capabilities for test and low-volume commercial quantities of pharmaceuticals. The project would provide for the creation of approximately 82 permanent full-time jobs at the site. In addition, the proposed project would make economic use of the land and directly benefit the City through significant contributions to total property, payroll, sales, gross receipts, and utility tax revenues.

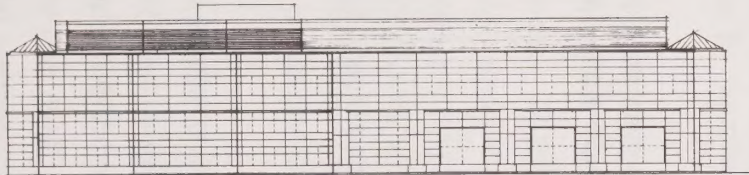
3.4 APPLIED BIOTECHNOLOGY

Biotechnology is a term that defines the use of a variety of modern biological methods including genetic engineering or "gene splicing." Genetic engineering typically utilizes bacterial, yeast, or mammalian cell cultures to replicate genes of interest for research study and the manufacture of gene products for commercial use. A gene is a basic unit of DNA (the genetic makeup of a cell) which in turn encodes information for the production of specific proteins, such as a hormone, enzyme or growth factor. In standard biotechnical applications, genes isolated from one organism are inserted into the DNA of another, the host cell. The manipulation of DNA during genetic engineering involves complex technical procedures that are highly regulated by various government agencies.

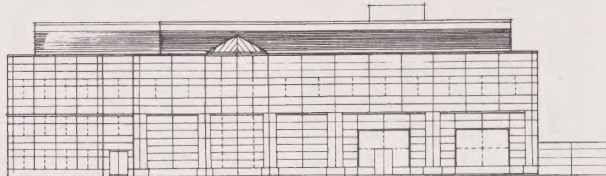
The use of microorganisms to act as host cells is common to both academic research and the biotechnology industry. For example, some common types of bacteria often are used as a vehicle for gene replication. In this way, many copies of the desired gene can be produced in a relatively short period of time so that scientists may study their structure and function (e.g., in cancer research).

BUILDING ELEVATIONS

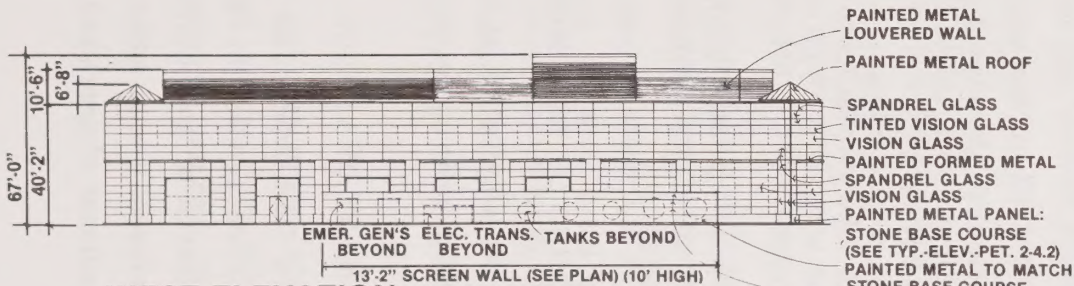
FIGURE 3-4



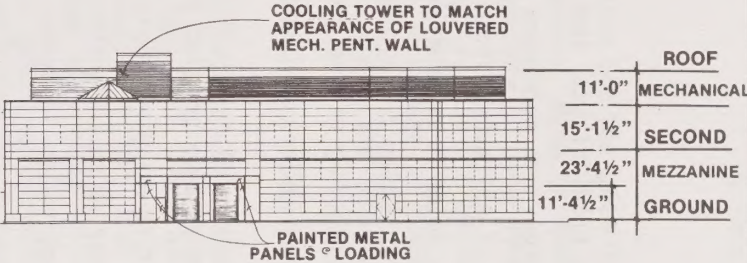
EAST ELEVATION



NORTH ELEVATION

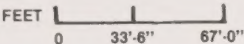


WEST ELEVATION



SOUTH ELEVATION

SOURCE: HELLER & LEAKE ARCHITECTS



In commercial applications, the products of the desired gene, i.e., specific proteins referred to above, are produced by the host cells and can be separated from the cell culture media or extracted from the harvested cells. Using this process, proteins that have important roles in combating, preventing or diagnosing disease can be produced in large enough quantities for clinical use. In the proposed Chiron Pilot Plant, manufacturing would principally utilize yeast, but also bacteria and mammalian cells, as hosts for protein production under regulated conditions.

Biotechnology may also be used for veterinary applications and enhancement of agricultural plant species to give them new traits or properties. These applications involve deliberate release or introduction of modified organisms into the environment. Chiron's biotechnology activities, however, are solely for the purpose of developing and manufacturing new human pharmaceutical products. Products which Chiron currently produces include:

- o SOD (superoxide dismutase) - an enzyme currently in trial testing to treat heart attack patients, and which may be used to enhance recovery in heart and kidney transplant patients;
- o IGF (insulin-like growth factor) - a hormone-like protein that promotes the growth of muscle and bone, and which may prove useful in the treatment of osteoporosis (bone loss and degeneration in the elderly);
- o EGF (epidermal growth factor) - also a hormone-like protein that fosters epidermal cell proliferation and may be used in burn and wound healing, for ulcers, and in cataract surgery.

3.5 BACKGROUND ON RECOMBINANT DNA

To understand the application of biotechnology at the Chiron Pilot Plant, it is useful to review some of the basic concepts involved with the use of recombinant DNA.

THE RECOMBINANT DNA (rDNA) PROCESS

All living things, from subcellular particles to higher organisms, contain species-specific genetic information needed for their reproduction and biological function. The basic repository or source of this information is deoxyribonucleic acid (DNA), which is the principal substance of genes, which are the units of heredity. Each cell of an organism is composed of a number of organized structures, several of which contain DNA molecules.

DNA plays two biological roles: 1) it provides information for the growth, reproduction, and other life functions of the cell, and 2) it preserves, directs and transfers the replication of this information from generation to generation. These two roles of DNA are common to animals, plants, single-cell organisms (e.g., yeasts and bacteria), and many viruses. During the past 30 years, knowledge about the structure of DNA molecules has steadily advanced. Basic processes have been studied intensely, and can now be described in detail.

The DNA molecule may be compared to a long spiral "ladder" (the double helix) with thousands to billions of rungs linking both sides of the "ladder." The sides of the ladder are formed by chains of sugar molecules (deoxyribose) attached end-to-end through phosphate groups and the "rungs" are composed of four chemicals called "bases," the sequence of which encodes the information. Besides the principal hereditary DNA found in the chromosomes of the cell nucleus, DNA molecules also include plasmids, found in bacteria; the DNA of chloroplasts, common to green plants; and the DNA of mitochondria, the energy-producing units of the cells of complex organisms. Recombinant DNA (rDNA) technology provides methods with which DNA, the primary genetic material in all cells, can be "spliced" to form new genetic material in what is essentially a "cut and paste" process.

Recombinant DNA techniques are used in a wide variety of research areas, the vast majority of which do not entail the creation of new production organisms or their release into the environment. These same techniques can be used to study the effects of genes within a particular species without moving any genetic material from one species to another. This enables a large number of copies of the genetic material to be made so that the structure and actions of genes can be studied. In some cases the DNA is extracted from the cells for study; in others, the properties of the cells containing the recombinant DNA themselves are investigated.

A great deal of research is performed using tissue cultures grown under laboratory controlled conditions. These tissue cultures consist of isolated mammalian cells maintained in a laboratory culture and are not able to survive in the external environment.

Although genetic engineering by selective breeding has been practiced for thousands of years to produce, for example, domestic animals and new horticultural varieties, public concern has arisen regarding creation of new gene combinations in the laboratory. The most intense controversy has involved research which has inserted genetic material into bacteria, fungi, or plants which was then to be released into the environment. For example, recent field studies examined the application of bacteria created with rDNA technology to plants to protect them from frost damage.

This type of application is different from those planned in the proposed project. The production processes in Chiron's Pilot Plant would not use robust organisms that could survive in the wild and, furthermore, the work would take place in closed systems. It is important to note that the yeast and bacteria strains used by Chiron are not considered hazardous and are therefore exempt from federal guidelines.

rDNA in Nature

Recombination results from breaking and then joining of two separate DNA molecules. The two molecules involved may be from the chromosomes of the organism itself, or one or both of them may be the DNA of a foreign entity such as a plasmid or virus. Natural recombination between different species of single-celled microorganisms has been described in a limited number of cases. It is not known how widespread interspecies recombination is in nature.

Genetic information, or rather segments of DNA molecules bearing this information, can be exchanged naturally between chromosomes and between different regions of a given chromosome during reproduction. This phenomenon of genetic exchange has long been known to occur within living cells, from simple, single-celled organisms to more complex animals and plants. Such genetic recombination contributes significantly to biological diversity.

In complex organisms that reproduce sexually, each offspring receives DNA from its parents. Every human being, for example, receives half of its complement of DNA from a sperm cell and half from an egg cell. The DNA is usually composed of segments that have been rearranged by a breakage/rejoining processes. Thus in each generation, human genetic material is recombined.

rDNA in Manufacturing

In a commercial setting, the first step in the research phase is to isolate the DNA code from two different cell types, for example, human and the bacterium, E. Coli. Each DNA is then broken into segments with enzymes, recombined in a test tube, and then reinserted into the host cell. Each segment may contain one or more genes, or it may contain a portion of the DNA that lacks certain functional genes.

From a small culture of this mixture of E. Coli host cells, each containing a different (human) DNA or gene fragment, many individual colonies are isolated by allowing each cell to multiply separately. The resulting population of identical cells in each colony is called a "clone." The word "clone" means a population of cells with identical DNA content.

The desired clone containing the (human) gene of interest is selected from this collection of colonies. The "cloned gene" is then placed into another host cell, such as a yeast cell, previously tailored to maximize production of the desired gene product protein. The manufacture of the product protein by this cell is called "expression," and the cell, with its resident DNA gene, an "expression system."

All of the work described above is part of research which is currently carried out, and would continue to be carried out, at Chiron's existing facilities. The resultant "expression system" would be turned over to the company's manufacturing division for use in the Pilot Plant. After some further optimization of production conditions and purification methods, these "expression system" clones, when fermented in large volumes, become capable of producing larger quantities of proteins, the gene products. The rDNA-containing cell essentially acts as a mini-factory.

In the case of the Chiron Pilot Plant, such rDNA expression systems (clones) would be used to produce a variety of substances that would be designed to provide benefits to human health.

There is a public perception that recombinant DNA technology poses a threat to human health. As a result, several governmental agencies are charged with oversight authority for industries involved with the use of rDNA. These include the National Institute of

Health and the federal Food and Drug Administration. The proposed Pilot Plant would be involved with the manufacturing of yeast proteins. Its operations would therefore be regulated by the federal Food and Drug Administration. The National Institute of Health (NIH) has determined that the type of manufacturing processes planned for the proposed Pilot Plant would not pose a sufficient threat to human health to need their regulation. However, the NIH Guidelines would be followed by Chiron even though they are not bound by regulation to do so.

3.6 PROCESS DESIGN

The Pilot Plant design includes nine process and support areas, numbered 100 through 900. These areas correspond to room numbers shown on the floor plans on Figure 3-5. Areas 100 through 400 would contain fermentation, recovery and purification equipment, respectively. Areas 500 and 600 would contain, respectively, process equipment and supporting utilities for mammalian cell culture. Area 700 would contain laboratory space. A clean-in-place (CIP) process is common to the process areas 100 through 400. Its purpose would be to ensure complete cleaning of piping and vessels between cell population batches.

Area 800 would contain facilities for bulk storage and treatment of hazardous chemicals or process waste. The utility systems which would provide steam, water, compressed air, and heat, ventilate and air-condition the building would be contained in Area 900. The following paragraphs describe each area.

Area 100 – Media Mix

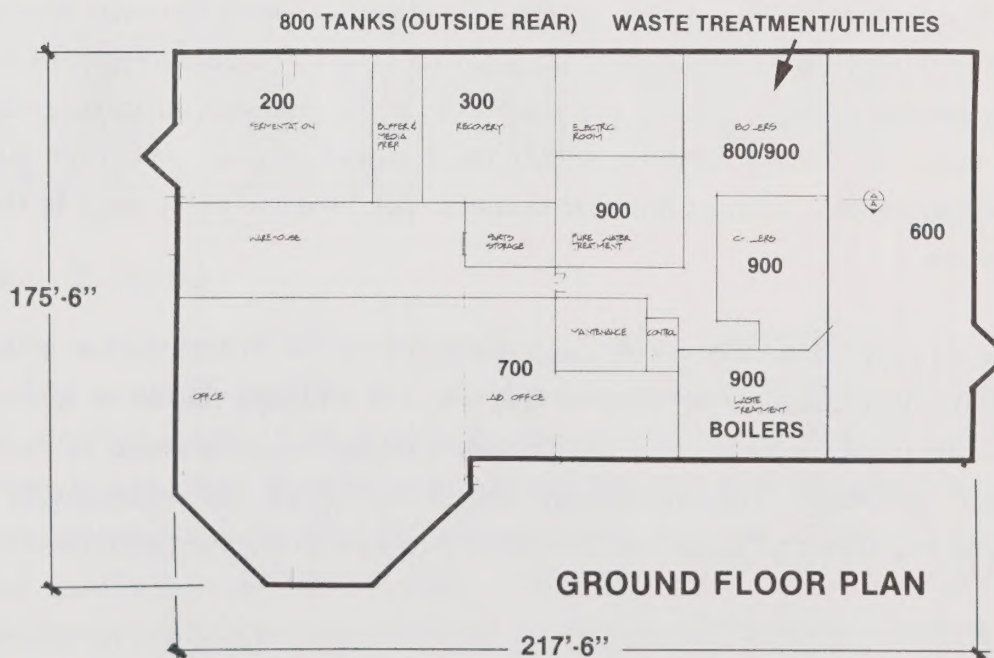
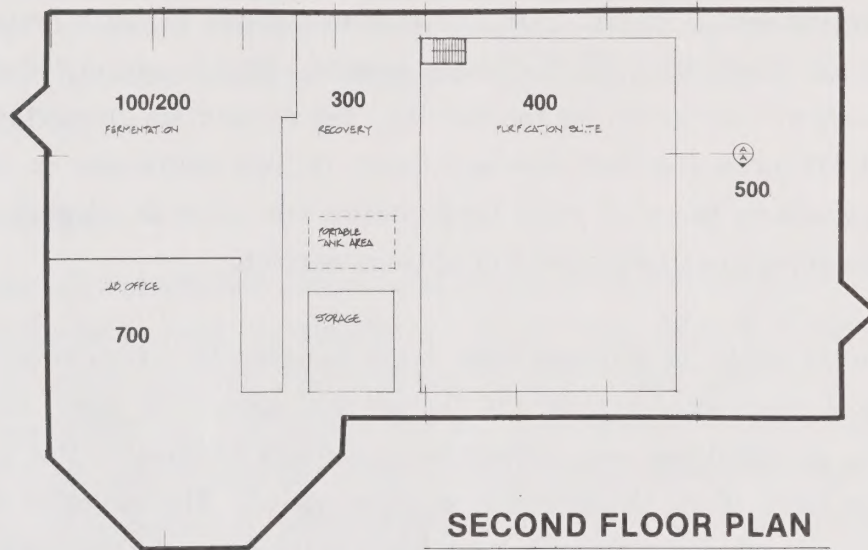
In this area, different nutrient substances would be combined prior to fermentation. Media would be mixed together in several ways. Initially, a media mix tank and solids blender would be used to form a variety of nutrient or growth media solutions for the fermenters in Area 200. Some of these batches would undergo further mixing to form an additional fermentation nutrient or substrate (currently 30% glucose) in a substrate day tank and a substrate distribution loop. This equipment would be used to store and continuously distribute substrate (nutrient) solution to the fermenters in Area 200 through sterile filters before and/or during fermentation (to "feed" the growing yeast culture cells).

Area 200 -- Fermentation

In this area the yeast nutrient media which were mixed in the media mix area would be sterilized by steam heat, then inoculated with a small culture and allowed to ferment thereby creating new products. This is similar to the way in which cereal grains, grapes, or potatoes are used with yeast to create alcohol. This is accomplished in a variety of fermenters which are planned for the facility. The fermenters planned include one 10,000 liter, two 1,000 liter, five 200 liter and thirty 10 liter containers or tanks. All of the fermenters would be based on yeast fermentation but could be adapted to other kinds of fermentation processes should future conditions warrant.

The fermenters would be stainless steel tanks designed to maintain carefully controlled environmental conditions that permit the optimal growth of yeast cells in suspension culture (i.e., as individual cells suspended in culture medium). The steel tanks would range in size from 10 to 10,000 liters, as noted above. The variation in fermenter size reflects the research scale, through Pilot Plant scale, to production plant scale units, for the manufacture of recombinant proteins from yeast cultures. To maintain the optimal growth environment for yeast cells, fermenters would be equipped with a number of process control devices which include: mechanical stirrers to keep the cells in suspension; aeration systems which pass compressed air into the tank to provide oxygen to the cells; temperature control systems to keep the yeast cells at 30 degrees Centigrade; pH control systems to keep the culture medium within the required, pre-set range (of acidity or basicity); and automated nutrient addition systems that feed the yeast cells as they grow to high densities.

There are a number of protective devices contained in the fermentation tanks which provide failsafe conditions. Everything which would be drained, leaked or spilled in the fermentation area and recovery areas which could contain live cells would be collected in a "kill system" hold tank. The "kill system" would destroy all live organisms by heating waste fluids to 140 degrees Celsius and maintaining this condition for two minutes.



SOURCE: HELLER & LEAKE ARCHITECTS

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Area 300 – Recovery

Here the fermented culture from Area 200 would be separated to recover the desired materials (media or cells) from the fermentation broth or "brew." Key operations used to perform this function include centrifugation, cell disruption, ultrafiltration and microfiltration. These functions would be accommodated in separate and isolated rooms in order to provide ample product separation as well as biocontainment of airborne materials that may be generated during operations. The equipment used to perform recovery functions would be serviced by an automated clean-in-place (CIP) system and all process streams containing recombinant organisms would be directed to a kill system in the fermentation area.

Area 400 – Purification

Once the fermented cells or media are harvested and the initial product recovered in Area 300 they would be brought or piped here for purification. Since they are to be used as human pharmaceuticals, further refinement of the product would be necessary to remove by-products, such as yeast contaminants, which are normally developed in the fermentation process. This involves complex separation and fractionation procedures and equipment, using mixtures referred to as "buffers." These are carefully prepared aqueous solutions with defined pH and other constituents to affect the separation steps and protect the product from becoming inactivated. The buffer materials would first be stored on shelves in a cold cabinet or freezer or at room temperature in the warehouse area. These materials would then be weighed in a buffer weighing area which would contain a fume hood and a biosafety cabinet to handle any hazardous chemicals. A water bath would be used to thaw frozen materials. The "buffer" solutions would then be mixed in a stationary or portable buffer tank and piped or transferred to a purification room. The purification processes would be conducted in a separate room for each product, provided with self-contained, separate air handling systems to prevent cross-contamination.

The purification area would be equipped with a clean-in-place (CIP) system comprised of two 100 liter chemical tanks, two chemical feed pumps, and a heat exchanger. The pure water used in this system would be put through a pressurized water loop used to drive the cleaning solutions. Spent CIP solutions would be allowed to enter the plant drainage

system per regulatory requirements. The tanks would be cleaned with cleaning machines and the flow rate of cleaning solutions would be approximately 20 to 25 liters per minute.

Area 500 and 600 – Mammalian Cell Culture

These areas would be used for the manufacture of more complex recombinant proteins in mammalian cell cultures in cases where the products cannot be satisfactorily produced in yeast or bacteria. These products include certain enzymes and viral antigens for vaccines in which the protein has critical sugar components attached by enzymatic processes unique to vertebrate or, occasionally, mammalian cells.

The mammalian cell culture operations are expected to involve several bioreactor (fermenter equivalent for animal cells) technologies designed for optimal growth of adherent cells (cells that grow by attaching to solid surfaces rather than growing in suspension culture in tanks as do yeast and bacteria) and probably suspension culture as well. The Pilot Plant would be equipped to grow recombinant cell lines up to the equivalent of 200 liter pilot scale batches. The most likely pilot scale bioreactor technologies to be employed include:

- o Stirred tank bioreactors with microcarriers
- o Ceramic matrix perfusion bioreactors
- o Hollow fiber perfusion bioreactors
- o Air lift bioreactors

This area would include support laboratories for the maintenance and storage of mammalian cell seed stocks, and preparation and amplification of initial low-volume inoculum cultures for the bioreactors. There would also be areas for the preparation of specialized mammalian cell growth media.

Sterility and biocontainment precautions would be much greater for these mammalian cell cultures than for yeast fermentations since the animal cells are much more sensitive to accidental contaminations during sampling or culture management. Automation would be extensive for all process controls and will be integrated into the Distributed Control System. Mammalian cell bioreactors utilize a large number of pre-sterilized disposable components (tubing, filters, matrix cartridges, hollow fiber modules, etc.) that would be

aseptically sealed and autoclaved before leaving the production area. As in the fermentation work areas, all bioreactor waste discharges and any samples taken from the bioreactors would be directed to the current or an analogous kill system. Unlike the fermentation process, only sterile, vacuum sealed samples would be taken from the cultures during production runs for analysis. The mammalian cell production areas would be self-contained, with separate HEPA (sterile) filtered air under positive pressure to maintain maximal sterility. There would be controlled access for personnel entering these areas who would be required to wear protective clothing and gear. All equipment and materials entering the production area would be cleaned and pre-sterilized. All equipment and spent materials having contact with cell culture fluids would pass through an autoclave before leaving the work area. Similar procedures would be required for the product recovery and purification areas of the mammalian cell culture area.

Product recovery and purification technologies would be distinct from, but analogous to, the manufacturing processes employed for yeast and bacteria. Stringent precautions would be taken to protect the sterility of the product and avoid any exposure of the Plant workers to the raw materials, even though these cells and all of their recombinant products are non-pathogenic and non-toxic.

Specific cGMP regulations which apply to the safety of mammalian cell cultures and their products oblige manufacturers to demonstrate the integrity of strain characteristics at periodic intervals. For example, a cell culture procedure for recombinant proteins should provide harvested material of consistent titer (concentration in the culture medium or cell extract). A loss of titer (product level in culture) might indicate the presence of an unwanted mutation or selection of a non-producing variant cell population. For these recombinant, the genetic stability of the inserted genetic information (engineered genes) would be demonstrated as requested by FDA Points to Consider Documents.

Area 700

Area 700 consists of the analytical and development laboratories for process improvement, quality control and quality assurance. There would be 13 laboratories included in the facility. For example, they would be used for the analysis of product material using such techniques as high performance liquid chromatography (HPLC).

Standard laboratory services including air, vacuum, water and natural gas are planned for all the laboratories.

Waste Treatment and Bulk Storage

Area 800. In this area liquids used in pilot manufacturing processes would be collected in several segregated systems. Waste liquids containing solvents would drain to a collection tank to be removed by truck. All other wastes would go to the sanitary sewer. They would be pretreated as required to meet discharge standards in the various systems before discharge into the sewer system.

Utilities Systems

Area 900. This area is designed to provide continuous service to the plant with minimal downtime. The services to be provided would include process steam, pure steam, chilled water, chilled propylene glycol, vacuum, compressed air, and pure water. All of these systems would be self-contained with inputs to the distributed control system for tracking and unit status (see below).

3.7 PROCESS CONTROL SYSTEM

The Pilot Plant manufacturing process would be monitored and controlled by an automated centralized computer control system (Distributed Control System or "DCS"). A "Pro-Vox" integrated system would provide state-of-the-art instrumentation to monitor process efficiency, minimize product contaminations and avoid mechanical and hazardous chemical accidents which could threaten the health and safety of the technical staff. All fermenters and ancillary support systems would be linked to and run by the DCS. The system would sample and analyze fermenter and other tanks for various gases. The system would sample for ethanol from up to 20 fermenters simultaneously. Ethanol is used as an indicator of yeast metabolic activity during the manufacturing process.

An engineering work station would monitor routine processes and maintenance programs as well as the supervision of configuration changes to the operating system. For example, the DCS would report the status of all pumps, valves, switches, centrifuges, probes and other hardware items and compare data to the current Standard Operating Procedure for a particular process.

Automatic alarms would alert operators to equipment malfunctions or improperly connected piping or machinery couplings. All piping connections would have specific electronic signals (signatures) conveyed back to the computer. The DCS system would determine that the correct piping connections have been made and that fluids have been transferred through designated piping network panels. Backup and supervisory features of the DCS help avoid accidents or inadvertent exposure to live cell culture fluids.

The DCS would constantly monitor and report on environmental conditions in critical areas of the plant, for example in the purification area. It would trigger alarms if there were a real or apparent breach of sterility or biocontainment. The DCS would serve as a central data processing system for environmental monitoring, inventory control, quality assurance traceability, inspections, security checks and personnel accountability.

Validation

The basic purpose of validation is to produce sufficient evidence that a computer system does what it purports to do in a reliable manner, has done so in the past, and will continue to do so in the future. This evidence must be collected and documented for use by managers, quality assurance and quality control personnel, auditors, and regulatory officials. Key concerns in validation include the performance, integrity, security, and accountability of the system.

Validation is the process of establishing documented evidence that a system does what it is supposed to do - and only what it is supposed to do. The U.S. Food and Drug Administration (FDA) conducts validation inspections to review this documentation. The purpose of the validation inspection is to ensure that the manufacturer is in compliance with the CCMPs.

The validation effort entails both process validation and system validation. Process validation establishes evidence that the manufacturing substrates and process will produce the product claimed to be produced. System validation establishes evidence that the control system and the associated strategies will properly control the process to produce the product claimed to be produced.

Malfunction

The DCS uses a modern computer/automation "failsafe" design, often found in other critical systems where shut-down must be avoided, such that all key items and systems in the DCS are redundant, i.e., it really consists of two identical systems running simultaneously, in parallel, as back-up to one another. Thus for an actual system failure to occur, both units must fail at the same time and in the same manner -- an extremely unlikely event (represented as the square of the probability of it happening to either one alone).

Should some sort of DCS system failure occur, despite the above and build-in battery and available emergency power etc., the plant would automatically cease operation and the programmed shut-down would occur such that all tanks, fermenters etc. which might otherwise release potentially hazardous materials would be sealed, due to the design of the valving so as to move into a closed position, i.e., the plant is "buttoned-up."

Although there are human-accessible read-outs of process conditions and equipment status, which would allow for direct operator monitoring without DCS intervention, the plant cannot be operated manually. The production runs are thus sacrificed to protect the plant workers' and public health and the environment.

4. ENVIRONMENTAL SETTINGS, IMPACTS AND MITIGATION MEASURES

4.1 LAND USE AND PLANNING

SETTING

Existing and Proposed Land Uses

The proposed Pilot Plant site is located in the Bayfront Area of the City of Emeryville. The Eastshore Freeway (I-80) borders the 2.6-acre parcel (Assessor's Parcel 49-1516-7) to the west, and Shellmound Street forms the eastern limit. The project would be built on a site which formerly housed the Judson Steel Company's operations and is currently vacant.

Development in the vicinity of the proposed project site is industrial and commercial. The proposed Shellmound Park adjacent to the north would consist of office space and a hotel development. The Powell Street Shopping Plaza lies further north. To the south, Barbary Coast Steel operates a manufacturing "mini-mill" which produces steel reinforcing bars. Across Shellmound Street, the Pfizer Corporation leases property to Myer's Container Corporation, a steel drum reconditioning business that includes an outdoor storage yard and a one-story warehouse.

General Plan Policies and Zoning Ordinance

Emeryville's General Plan (as amended by the Emeryville City Council on May 3, 1988) designates the area which includes the proposed Pilot Plant site for Mixed Use (M-U).^{1,2} Under this designation, a broad range of uses are allowable, but are subject to a Conditional Use Permit.³ The General Plan encourages compatibility among land uses and specifically cites visual conflicts and noise as issues to be addressed in land use decisions. Building Intensity requirements for the project area restrict Floor Area Ratio (FAR) to 1.3, and Building Form requirements limit development to low-rise (i.e., three stories) structures.^{4,5}

IMPACTS

Land Use

The proposed project is a pilot biopharmaceutical manufacturing plant which would be considered a "light industrial" use under the land use definitions presented in the General Plan. As such, it would be a less intense use than has been conducted previously on the site. The project as proposed would not have extensive external effects in the form of noise, dust, glare, or odor. The activities which would be performed at the Pilot Plant are described in Chapter 3, Project Description, and the environmental impacts of construction and operation of the facility are discussed in the remainder of Chapter 4.

General Plan Policies and Zoning Ordinance

The Pilot Plant would be consistent with General Plan policies, including those relating to noise and visual conflicts. The proposed use would be compatible with other existing, planned, and potential future uses in the vicinity. The General Plan land use designation for the project is office. The project site is also within an "option area" this area has been so called due to its ease of freeway access. Policy 29 of the General Plan indicates that the City should permit regional retail uses in this area if there is sufficient market interest. The Zoning Ordinance is the implementation document for the goals and policies outlined in the General Plan. The site is within the mixed-use (M-U) zoning district. A Conditional Use Permit for the Pilot Plant would be required for operation in this district.

The project would be in compliance with the Building Intensity and Form requirements set forth in the Zoning Ordinance. The Pilot Plant would have a Floor Area Ratio of approximately 0.93 and would rise two stories (maximum height 67 feet). No adverse impacts related to zoning would be created.

MITIGATION MEASURES

The project would not create adverse land use or planning impacts. No mitigation measures are required or suggested.

¹Sedway Cooke Associates, Emeryville General Plan, Adopted by City Council June 2, 1987, p. III-91.

²Bayfront General Plan Amendment (G.P. 88-1), Adopted by the Emeryville City Council, May 3, 1988.

³Sedway Cooke Associates, Emeryville Zoning Ordinance, September, 1988, p. 9-4.36-1.

⁴Ibid., Building Intensity Map.

⁵Sedway Cooke Associates, op. cit., Figure III-18, Building Form.

4.2 PUBLIC HEALTH

4.2.1 POTENTIAL BIOLOGICAL HAZARD

This section discusses the genetic engineering and manufacturing processes at the proposed Chiron Pilot Plant. The purpose of this discussion is to assess any potential biological risks to public health and the environment.

SETTING

The environmental setting for consideration of potential biohazards first describes the federal regulatory framework, then the industry standards for safety, and finally State and local regulations.

Regulatory Framework

Federal Food and Drug Administration (FDA) Regulations. Virtually all bulk biologicals to be manufactured at the Chiron Pilot Plant facility are intended for medical (therapeutic and diagnostic) applications. The few possible exceptions would be the industrial enzymes used in food processing and preserving. All of these medical and food-related recombinant products are subject to FDA licensing regulations issued by the U.S. Office of Biologics.

The Chiron Pilot Plant would be subject to both product licenses for specific biologicals and an establishment license for manufacturing facilities producing that product. The licensing regulations address product manufacturing specifications as well as biosafety concerns for plant workers and potential accidental exposure to raw materials.

The specific product and establishment license validation standards which apply to the medical biologicals are outlined in the Federal Register Publication of September 29, 1978 - Part 211 entitled "Current Good Manufacturing Practice for Finished Pharmaceuticals" (cGMP). This publication, with revisions through 1986, sets specification standards with which Chiron qualifies and validates all equipment, personnel and processes to keep the facility in full compliance with the FDA regulations at all times. The qualification process would be conducted by the Chiron Validation Team and would be inspected and licensed by the FDA.

The Good Manufacturing Practice standards result from the codification by the FDA of common sense and preventative planning characteristic of an efficient manufacturing facility. For example, in production processes for yeast fermentation, and for mammalian cell culture facilities in particular, extreme care must be taken to prevent contamination of the product by foreign microorganisms. Protection of the working environment, in order to protect process raw materials and Plant workers is, therefore, paramount. Accordingly, regulations exist to maintain a strict parts and maintenance (P&M) program which includes routine replacement of gaskets, filters, diaphragms, and other expendable components in the plant including bioreactors, fermenters, centrifuges, pumps, grinders, ultrafiltration units, holding tanks and transfer piping lines.

Personnel would be trained and tested in order to carry out correct cleaning, inoculation, sampling and monitoring procedures used in production operations (including fermentation, product recovery, and purification). Staff must possess a comprehensive understanding of the manufacturing operations they perform, the safety considerations of their work environment, and the relationship of both to regulations. Safety testing of the production material would be performed frequently during plant operation. Routine sterility tests would be conducted to detect bacteria, fungi and mycoplasma infections. Additional tests for adventitious agents consist of inoculating susceptible cell cultures and monitoring for infection by viruses or microorganisms.

National Institutes of Health Regulations for Genetic Engineering: Recombinant DNA Activities Guidelines

The manufacturing processes for producing biologicals at the Chiron Pilot Plant employ industrial strains of yeast and bacteria which are specifically exempt from current Recombinant DNA Activities Committee (RAC) guidelines (see Appendix C-1, 51 CFR, No. 88). These strains are now used to produce biologicals for clinical trials at the Chiron manufacturing facility in Manteca and are in widespread use throughout the industry. Similar exemptions apply to the lines of mammalian cells anticipated for use in the production of more complex biologicals.

Historically, the National Institutes of Health (NIH) has been careful to impose restrictions or issue guidelines for research involving organisms, materials or techniques that were considered potentially harmful. In the early 1970's, as genetic engineering

techniques were initially developed, there was concern that recombinant DNA experiments might result in the release of genetically altered microorganisms which could pose risks to the environment or human health. In 1975, the National Institutes of Health, the National Academy of Sciences, and the National Science Foundation assembled experts in the field to assess potential risks of recombinant DNA research and to recommend actions to ensure the safety of research workers and the public. This conference, held in Asilomar, California, was a landmark event in the development of precautionary guidelines for genetic engineering.

In 1976, the NIH issued the original RAC Guidelines that restricted recombinant DNA research to the expression of non-toxic proteins in weakened, non-pathogenic organisms and imposed strict biocontainment measures for all genetic engineering activities. However, as the recombinant DNA techniques were developed in laboratories across the country and around the world, it became recognized that while this new technology was not inherently dangerous, the potential for using it to produce medical and other beneficial products was substantial. Over the past decade, the RAC Guidelines have been relaxed as modern techniques in molecular biology continued to show that most genetic engineering activities posed little threat to people or the environment.

More recently, the Recombinant DNA Advisory Committee has further reduced restrictions on the use of conventional industrial microorganisms in large scale fermentation facilities for the production of biologicals. In 1986, the Committee drafted specific relaxations of previous restrictions on large scale fermentations. The RAC Guidelines now specifically exempt recombinant DNA work involving the following cells which would be grown at the new Chiron Pilot Plant facility:

- o Conventional yeast strains (*Saccharomyces cerevisiae*)
- o Conventional bacterial strains (*E. coli*)
- o Tissue culture cells expressing fragments of viruses for making vaccines

A copy of the updated NIH Guidelines published in the Federal Register (CFR Vol. 51, No. 88, Part III; May 7, 1986) is included in Appendix C-1. For large-scale fermentation experiments involving these recombinant yeast and bacterial strains and tissue culture cells, the 1986 Guidelines recommended Biosafety Level 1¹, Large Scale (BL-1, LS) physical containment conditions (summarized below). However, in 1987, the RAC determined that "this degree of containment is expensive, unwieldy and unnecessary."²

Although the bacterial and yeast strains and mammalian cell lines used by Chiron are conventional fermentation or cells culture organisms with an extended history of safe industrial use and are exempt from the RAC Guidelines, the Pilot Plant would operate under the basic primary level of physical containment conditions. The entire Pilot Plant is designed for Biosafety Level 1, Large Scale, compliance, and in some work areas, for Biosafety Level 2, Large Scale, compliance even though these precautions are not required by the NIH for the products Chiron currently intends to manufacture.

Although the NIH would not have to directly regulate the manufacturing activities for producing recombinant biologicals at the Pilot Plant, Chiron's Institutional Biosafety Committee would oversee all manufacturing operations to verify Biosafety Level 1 compliance. Much of this verification will be conducted in collaboration with the FDA Validation Team to "qualify" the facility for FDA licensing.

Biosafety Level Guidelines for BL-1 and BL-2, although not required for the Chiron facility, are briefly summarized below.

Basic Primary Containment Measures (Biosafety Level 1 and 2). For most recombinant DNA production systems of commercial interest, Biosafety Level 1, Large Scale (BL-1, LS) and Biosafety Level 2, Large Scale (BL-2, LS) are suitable and provide primary process containment. These levels mean that the process is contained, but the physical facility in which the process is located is not. The Biosafety Level 3, Large Scale (BL-3, LS) consists of BL-2, LS process containment plus secondary facility containment designed to prevent the release of viable organisms to the environment should the primary containment system fail.

The Chiron Pilot Plant has been designed with mitigation measures which span from BL-1, LS through BL-2, LS containment guidelines. For example, all cell culture fluids, equipment wash fluids, floor drain and sump pump fluids from the fermentation and product recovery areas are directed to the "kill system" to heat-sterilize any liquid which might possibly contain living cells. Similarly, all air vents from the fermenters and bioreactors, as well as the fermentation, mammalian cell culture and product recovery work areas, are filtered to prevent the release of any aerosols or microbes. The following paragraphs describe the requirements under Biosafety Levels 1 and 2:

Biosafety Level-1, Large Scale:

- (1) Operations must be conducted in a closed vessel for organisms containing recombinant DNA molecules.
- (2) Inactivation of culture by validated procedure before moving from a closed system.
- (3) Closed system collection and transfer of cultures in a closed system, preventing releases of aerosols or contamination of exposed surfaces.
- (4) Sterilization of the exhaust gas from the fermenters and all vessels containing viable organisms.
- (5) Sterilization by a validated procedure, before opening for maintenance, of any equipment handling recombinant DNA organisms.
- (6) Emergency plans and procedures for handling large losses in the fermentation area.

Biosafety Level-2, Large Scale Additional Primary Containment Measures:

- (7) No leakage of viable organisms from rotating seals and other mechanical devices.
- (8) Integrity evaluation procedures, monitors and sensors.
- (9) Containment evaluation with the host organism, before introduction of viable organisms into the system.
- (10) Permanent identification for the closed system, and use of this identification for all records.
- (11) Posting of universal biohazard signs on each closed system and on containment equipment when working with viable organisms.

State of California Regulations for Biotechnology

As with the FDA, Chiron is required to obtain Facility Licensing from the State for the manufacture of pharmaceutical products. This application is administered by the California Department of Health Services, Food and Drug Branch. Product specific (Investigative New Drug) licenses are not required if the products are already licensed through the FDA. Additional worker safety considerations and regulations would fall under the responsibility of the Department of Industrial Relations, Division of Occupational Safety and Health (Cal-OSHA).

Emeryville Ordinance Requiring Compliance with the NIH/RAC Guidelines

The City of Emeryville has a resolution requiring that genetic engineering activities fully comply with the NIH Guidelines for Recombinant DNA Activities.

State and Local Requirements for an Emergency Contingency Plan

Chiron Corporation will prepare an Emergency Contingency Plan for the new Pilot Plant facility in compliance with requirements of Title 22, California Administrative Code, Article 20, and Alameda County ordinances. When combined with the Inventory of Hazardous Materials, the Plan will also satisfy the Business Plan requirements of Title 19 (Title 26), CAC, Chapter 2 in accordance with standards adopted by the Office of Emergency Services.

Biosafety Committee and Procedures for Pilot Plant

In keeping with NIH guidelines for recombinant DNA technology (see above), Chiron established an Institutional Biosafety Committee (IBC) in 1982 to oversee research involving potentially hazardous biological materials. The IBC is charged with the responsibility to establish clear policy and create practical guidelines to ensure that all manufacturing activities are conducted as safely as possible. Safety considerations go beyond the protection of immediate technical staff working with the biological materials. Safety considerations extend to the entire company, community and end users of the products. The IBC presides over all biosafety issues at Chiron facilities and would be responsible for establishing and enforcing appropriate safety policies for the new Pilot Plant.

The Chiron IBC has wide representation from the company staff, ranging from senior research scientists to technical and administrative personnel. In addition, the twelve-member committee includes two outside members who are specialists in public health and biohazard containment issues.

IMPACTS

Potential Risks Associated with Cell Cultures

Nearly all large and pilot scale fermentations, bioreactor cultures, product recoveries and purifications would be closed system operations. An important exception to the isolation and integrity of the manufacturing process are the sampling procedures for product analysis and bacterial and yeast fermentation process control. Fermenters are automated with on-line measurement of pH levels, dissolved oxygen and temperature. Manual sampling would be required to measure glucose (the primary carbon source for yeast cultures), microscopically inspect for contaminations and analyze the batch for product concentrations (immunoassays). All of these measurements would be performed on small (less than 50 ml) samples maintained within the confines of the fermentation production area and/or in Quality Control and Quality Assurance laboratories. All samples would ultimately be discharged to the "kill system" or otherwise decontaminated. Plant workers would wear protective clothing and would be properly trained in the technical procedures and biosafety issues as mandated by the Chiron Validation Team. Yeast (or bacterial) fermentation sampling techniques have been in wide industrial use employing the same weakened strains to be used at the Pilot Plant for several years. Because these yeast and bacterial strains are not considered harmful or pathogenic, they are exempt from current NIH RAC Guidelines regulations.

Sterility and biocontainment precautions would be greater for mammalian cell cultures than for yeast fermentations since the animal cells are much more sensitive to accidental contaminations during sampling or culture management. As in the fermentation work areas, all bioreactor waste discharges and any samples taken from the bioreactors would be directed to the current or an analogous kill system or otherwise decontaminated. Unlike the fermentation process, only sterile, vacuum sealed samples would be taken from the cultures during production runs for analysis.

All cleaning and sterilization procedures for fermenter and bioreactors would be closed system operations under control by the Distributed Control System. There would be no exposure of workers to live cell culture or raw culture medium materials except in the sampling procedure described above. These procedures would be carried out by trained personnel only.

The presence of genetically-engineered cell cultures would have a less than significant risk to public health because:

- o The primary recombinant expression systems (production cells) planned for the Pilot Plant are conventional industrial strains of yeast and bacteria (non-carcinogenic organisms).
- o These yeast and bacterial strains, and currently planned mammalian cells as well, are exempt from current RAC guidelines and are in widespread use for industrial fermentations or cell cultures.
- o None of the recombinant products are toxic or hazardous; the vaccine products are small fragments of viruses that stimulate immunity with no risk of accidental infection.
- o No infectious agents or killed viruses would be in any vaccine product or in the building at any time.

Nonetheless, the Pilot Plant will be an FDA-licensed Current Good Manufacturing Practice facility with licensed products, and it will voluntarily operate as a Biosafety Level 1 or above production area.

Potential Risk of Escape of Biological Wastes

The potential risk of escape of biological materials would not be significant due to design features which would control escape as described below. Everything which is drained, leaked or spilled in the fermentation or mammalian cell culture area and product recovery areas which could have live cells would be collected in a "kill system" holding tank. This 30,000 liter tank can hold three times the entire contents of the largest (10,000 liter) production fermenter plus, or nearly twice the working volume of the Plant's entire fermentation capacity (assuming all units were in full operation) in the event of a complete containment failure (leak, rupture, accidental spill) anywhere in the large scale manufacturing process.

The "kill system" inactivates any biological material by sterilization under automatic controls. The "kill system" sterilizer processes the contents of the holding tank at 20 gallons per minute by heating the waste fluids to 140 degrees Centigrade and holding it for two minutes. Killed waste from the sterilizer will frequently be in the pH range of 3 to 5, i.e., acidic, and must be transferred to neutralization tanks where the pH of the waste fluid can be adjusted with caustic in preparation for discharge, under permit, into

the East Bay Municipal Utility District (EBMUD) sanitary sewer system. Neutralized waste would go to a blending basin, also provided with pH neutralization capability in case a plant upset occurs. Normal waste streams entering this basin would be within the 5 to 9 pH range required by EBMUD. Sanitary wastes (i.e., from toilets) would not be directed through the sterilization and neutralization system. Rather they would connect into the city sewer system downstream of the blending basin.

Sterilization by heat, rather than by hypochlorite (bleach), was selected for use at the Pilot Plant, because it is more reliable and safer to automate, and it avoids the use or discharge of toxic chemicals into the sewer system. As a further precaution, the "kill system" holding tank would be equipped with a submicron vent filter to prevent the escape of any airborne or aerosol microbes or cells.

Flow to the sterilizer unit from the plant process would, at times, be at a rate lower than the minimum utilization rate of the sterilizer. The sterilizer unit would handle this normal variable flow by diverting it back to the "kill system" hold tank until enough has accumulated and then process (heat sterilize) and direct it to the neutralization tank at the normal rate. In the event the system fails to hold the proper temperature or time limit for sterilization, the diverter valve would automatically prevent discharge of live organisms out of the fermenter area to the neutralization tank but rather it would be returned to the "kill system" holding tank. The sterilizer system could then be repaired, sterilized and returned to normal service.

Waste fluid from the entire, combined fermentation "clean-in-place" (CIP) system at the Pilot Plant is expected to flow at a rate of 8 to 400 liters per minute during the cleaning of all units. As discussed in the manufacturing process description, each fermenter cleaning cycle includes initial rinses with water discharged to the "kill system" followed by caustic and acid washes discharged to neutralization tanks. Similar procedures are used for CIP systems for the mammalian cell bioreactors product recovery centrifuges, cell grinders and ultrafiltration equipment.

The following operations and equipment areas drain directly into the "kill system" holding tank at all times:

Fermentation Operations

- o All fermenter discharges of waste and neutralized washes from the "clean-in-place" automated operations; pilot and large scale fermenters would be hard piped directly to the "kill system"; small scale units must be manually connected to stainless steel discharge piping leading to the holding tank. Fermenters would stand inside diked containment areas equipped with emergency sump pumps to discharge any accidental spills or leaks directly to the "kill system." Each dike and sump pump system can accommodate the entire liquid capacity of each fermenter.
- o Pressure relief valves would discharge to the ceiling within the diked fermentation work area so that steam condensate would be confined within the building.

Mammalian Cell Culture Operations

- o Bioreactor waste, wastings, spills, leaks and relief discharges would be handled, treated and managed essentially as described above for fermentation operations.

Product Recovery Operations

- o All waste discharges from closed system centrifuges, cell grinders and ultrafiltration units would be directed to kill system holding tank.
- o Centrifuges and ultrafiltration equipment would be isolated in separate rooms with floor drains to direct any accidental spills directly to the "kill system."
- o All floors in the product recovery area are sloped and drains lead directly to the "kill system."

Other Operations Connected To Kill System

- o All sinks in the fermentation, mammalian cell culture and product recovery areas would also discharge to the "kill system" holding tank.
- o All work areas where cultures or harvested product medium would be handled would have sloped floors and drains would lead directly to the "kill system" tank in the event of a spill.

Risk of Accidental Release of Biological Materials

The Chiron Pilot Plant has been designed to minimize the risks of a potential accidental spill or release of fluids which might contain living organisms. All fermentation, mammalian cell culture, product transfer, product recovery, and equipment cleaning operations would be closed systems monitored and controlled under by the Distributed Control System (DCS) as described in Chapter 3. In spite of precautionary plant design

and worker training, potential accidental occurrences cannot be completely ruled out. The following list summarizes the potential accidents related to the release of biological materials that might occur within the Pilot Plant under normal or upset conditions:

1. A sample of culture medium taken from a yeast or bacterial fermentation or mammalian cell culture run could be dropped or spilled during a routine culture analysis. Sterile and non-sterile samples are taken manually at least once a day for all fermentation runs. The frequency of sampling accounts for the higher probability of accidental spill or contamination during this operation.

Planned Response: Use emergency spill mops, squeegees and disinfectants to direct spill to floor drain or sump (which lead to the "kill system"). Spill mops and absorbent towels would be autoclaved after use.

2. Although a closed system for inoculation would be used in the facility, a flask of live yeast, mammalian cell or bacterial culture could be dropped or material spilled by a technician during initial inoculation of a small scale fermenter or bioreactor. (All other small volume culture transfer operations are conducted in defined, isolated laboratories using specially designed containment equipment to protect the operator and the environment and to prevent cross-contamination.)

Planned Response: Use available emergency spill mops and disinfectants to direct spill to floor drain or sump. Typical disinfectants would include bleach (3% hypochlorite).

3. A leak could develop in a pipe connection or fermenter or bioreactor inoculation line during transfer of culture fluid. This could be caused by the failure of a gasket or by an incorrect coupling.

Planned Response: See items 1 and 2 above. FDA parts and maintenance programs required for facility validation should prevent this occurrence. Also, the DCS would be able to detect inappropriate pipe connections and prevent the flow of fluids through them.

4. A leak could develop around a main seal in a fermenter, bioreactor or product recovery device (centrifuge, grinder, ultrafilter) causing release of potentially large volumes of culture fluid.

Planned Response: Hose down area with water, detergent and disinfectants. All liquids including the wash would be contained within diked areas around each piece of equipment and would be directed to the "kill system." Additional floor drains in the work areas would also lead to the "kill system."

5. A pressure relief valve might open or rupture during steam pressurization or normal operations. The escaping aerosol would be directed to the ceiling to contain condensate above the immediate area. Most liquid would fall into the diked area, the remainder would be diverted across the sloped floor to the sump.

Planned Response: High pressure hot water hoses, detergents and disinfectants would be used to wash down area and equipment. All wash liquids and any tank discharges would be directed to the "kill system."

6. A centrifuge or ultrafilter product recovery device could fail and spill its contents out into the work area. These pieces of equipment are all stainless steel, so this is an very unlikely event.

Planned Response: See item 5 above. Note that product recovery equipment would be segregated into separate work areas and would have greater physical containment than the fermenters. All discharges and wash liquids would be directed to the "kill system" through floor drains.

7. In the event of a major earthquake or explosion, pipes and couplings could potentially fail causing spills which would be confined to the work areas.

Planned Response: See item 5 above. All discharges and wash liquids would be automatically directed to the "kill system." The 30,000 liter "kill system" holding tank would have the capacity to hold nearly twice the entire volume of all the fermenters in the Pilot Plant at one time.

The probability of a small accidental spill is moderate given that culture fluid sampling is a frequent and manual procedure. However, the potential health or environmental impact of such an occurrence would be minimal since these recombinant organisms have been judged to present no risk, or inconsequential risk, to health and the environment, and they are exempt from the RAC Guidelines. More serious spills or equipment failures are less likely. The Pilot Plant has been designed to accommodate catastrophic releases of biological fluids without risk of escape to the environment.

MITIGATION MEASURES

Foremost among measures to mitigate potential adverse health impacts would be the exclusion of any infectious agent or biohazardous materials from the new Pilot Plant. Any routine analytical testing involving the use of live viruses, infectious or potentially infectious material, applied to production samples of new recombinant vaccines or diagnostic products would be excluded from this facility. All such vaccine or diagnostic products testing would be conducted at Chiron's nearby research laboratories equipped to perform these tasks.

All of the larger scale fermentations for producing key Chiron recombinant products (enzymes, growth factors and hormones) would use conventional yeast strains currently employed at the Manteca facility. The cultures and the products are intrinsically safe. However, additional precautionary measures would be put into effect to address remaining concerns about health, safety and potential accidental occurrences. These specific measures include:

1. No infectious agents, live or intact viruses, pathogenic bacteria, contaminated patient samples or any other nucleic acid or biological materials which may be considered as a potential biohazard would be allowed into the Pilot Plant. The new Pilot Plant would be exclusively a process development and initial production scale-up facility for well-characterized commercial, pharmaceutical grade products. It should not to be confused with research facilities that are involved in isolating, cloning and characterizing individual gene products from viruses or other pathogens.
2. All analytical testing of vaccines and production samples, which may require the use of nanogram or microgram amounts of infectious agents per assay, would be performed at dedicated Chiron research laboratories, not at the Pilot Plant.

3. The yeast strains destined for scale-up at the Pilot Plant are the same as those currently grown at Chiron's existing Manteca Plant. They have been selected to contain specific genetic deficiencies which require specific nutritional supplements in the medium for these cells to grow. This precaution, as originally recommended in 1976 by the NIH guidelines for research on recombinant organisms, ensures that the yeast cultures would not survive if they escaped into the environment. These yeast strains, even with the nutritional supplements, are not particularly strong in any case, and can be easily overrun by natural microbe populations if there is an accidental breach of sterility. These yeast strains contrast with the hardy brewery yeast strains that are essentially maintained as "open" cultures without any concern for sterility.
4. The bacterial strains (derivatives of the conventional K-12 strain of E. coli) to be employed at the Pilot Plant would be genetically selected for specific deficiencies which would prevent their growth outside the ideal culture conditions maintained in sterile fermenters. Most of the fermentations at the Pilot Plant would be yeast cultures; the few bacterial fermentations anticipated for specific diagnostic products would be limited to 10 to 100 liter scale cultures.
5. The mammalian cell lines (CHO, Vero) for use in manufacture of vaccines and/or some diagnostic products in the Pilot Plant contain only a small fragment of a virus genome. They are well established and understood industrial cultures which present no risk of infection and are exempt from the RAC Guidelines.
6. Separate, self-contained work areas and separate ventilation would be constructed for each phase of the production process at the new Pilot Plant to minimize the possibility of cross contamination and maximize the containment of biological materials. For example, fermentation areas would be completely separate from product recovery areas which in turn would be completely separate from the product packaging and filling areas. Mammalian cell cultures would be separate from all of these others. Similarly, all small scale fermentations (10 liters) would be in separate areas (up to 10 fermenters per self-contained room) from the pilot scale systems (200 liters), which in turn would be separate from the large scale fermentation systems (1,000 and 10,000 liters). The fermentation areas would be maintained with recirculating, high efficiency particulate air (HEPA) filtered (sterile) air at 140,000

cubic feet per minute (cfm) to meet unclassified clean area specifications for particulates. Recirculated air would be augmented by a small amount of filtered outside air.

7. Complete containment of all ventilation air for these separate work areas would be achieved with FDA-validated air filtration systems (HEPA filtered, 0.2 micron to remove all microbial contaminants). Filters would be routinely sterilized and cleaned. All fermentation and recovery areas (where intact live cells would be handled) would operate under negative pressure air ventilation to contain any air that might contain organisms that escaped from the process systems as mandated by the RAC Guidelines. In addition, purification and filling work areas would have positive-pressure air ventilation to "push" air out as someone opens a door to enter or leave the area. Standard FDA enforced practices for all pharmaceutical operations that involve production of injectable grade biologicals would be employed to protect the product from contamination.
8. Fermenters would be made of pharmaceutical grade 316 stainless steel with welded seams and electropolished surfaces. Transfer tubing would be all stainless steel. Sample ports would be equipped with steam-sterilization features. All on-line probes would be fitted with double gasket seals that would allow them to be sterilized in place, minimizing the need to expose the culture medium to the outside environment or the worker to the culture. This area would also be provided with negative air pressure to ensure no escape of organisms in the event of a leak in this area. All fermenters, bioreactors or tanks for holding live cells would be equipped with routinely cleaned, sterilized and tested HEPA filters to remove microbial cells from the exhaust air before release to the atmosphere.
9. Additional physical containment barriers for liquids would include the construction of sealed dikes under all fermentors, bioreactors, product recovery centrifuges, ultrafiltration systems, and purification columns. Diked areas would be designed to collect and transfer the full capacity of the tank or device they are serving in the event of an accident. Dikes would drain or could be pumped directly to the "kill system." All catch drains and sink drains in the production facility work areas would lead directly to the "kill system" tank.

10. Machinery parts and maintenance programs have been designed to comply with the stringent FDA regulations governing the specifications and frequency of maintenance on all centrifuges, pumps, filtration units, valves, and other hardware which handle cells or the harvested cell products. For example, sanitary-grade gaskets for pumps and piping could not be substituted without requesting approval from the FDA for the change in manufacturing protocol. All piping assemblies and functions would be monitored by the DCS which would automatically trigger alarms if an inappropriate pipe connection or fluid transfer is made.
11. All fermentations, product recovery and handling of yeast and bacterial cells before, during and after the manufacturing process would be conducted in full voluntary compliance of Biosafety Level-1 (Large Scale) standards originally recommended (but no longer required) by the NIH guidelines for recombinant DNA activities. In addition, the vaccine production mammalian cell culture areas would also comply throughout with Biosafety Level-1, Large Scale RAC guidelines for large-scale operations and, in some areas, to Biosafety Level-2, Large Scale as a precaution to minimize potential biosafety concerns and to ensure against cross-contamination of products. It should be noted that the yeast, mammalian cells and the E. coli K-12 bacteria strains which would be grown at the Pilot Plant are exempt from Biosafety Level guidelines (i.e., the NIH does not consider the potential health hazards from culturing these organisms to be significant enough to enforce compliance with its Biosafety Guidelines).
12. Purification work areas, where recombinant products are handled in high concentrations, would be isolated from outside corridors by airlocks. People, equipment, glass and raw materials would flow into the purification areas from the clean corridor. Used equipment, most spent materials and waste products would be transferred to autoclaves or otherwise sterilized. Equipment would be reused only after cleaning and sterilization.
13. An Emergency Contingency Plan would be drafted in consultation with the IBC (Institutional Biosafety Committee) to train designated personnel to safely manage the containment and disinfection of biological fluids in case of an accidental spill or a catastrophic event.

14. FDA regulations for purity in product manufacturing are designed to ensure protection of the product from contamination. This would provide the added benefit of providing safeguards to both workers and the public of potential accidental release of harmful substances from the plant (see Section 4.2.2.)
15. The implementation of institutional and environmental mitigation measures would be supervised by the Chiron Institutional Biosafety Committee.
16. Specific quality assurance and environmental health and safety criteria would be verified before operations begin. The Pilot Plant facility would be qualified and validated routinely by the Chiron Validation Team in accordance with FDA requirements and/or specific recommendations from the Biosafety Committee. The FDA would visit the new facility to inspect for compliance prior to operation commencement and is obligated to revisit Chiron at least every two years.

¹The Biosafety Levels (BL) correspond to the previous "Physical" (P) containment plus additional biological safety aspects.

²Code of Federal Regulations, August 24, 1987, pp. 318-19, Section B, Part II, "Actions Under Guidelines."

4.2.2 CHEMICAL AND RADIOLOGICAL HAZARDS

SETTING

Analytical Method

The assessment of chemical and radiological hazards at the proposed Pilot Plant was conducted by the consulting firm ERM-West under the direction of Charles L. Keil, a Certified Industrial Hygienist (CIH).

On December 7, 1988, site visits were made to existing Chiron facilities at Manteca, California and Emeryville, California. Interviews with Thomas Sanders, Ph.D. (Manager, Business Development, Chiron Corporation), and Nelson Hiner (Manteca Fermentation Plant Manager, Chiron Corporation) were conducted as part of the site visit. A data needs lists was generated in conjunction with EIP and submitted to Chiron. The CIH reviewed the documentation supplied by Chiron.

Each proposed process area identified in the preliminary design for the facility (prepared by Jacobs Engineering) was reviewed for potential risks from chemical and radiological material usage. The proposed chemical and radioactive material inventories were reviewed. Chiron's operating and training procedures were reviewed.

Hazardous Materials

Process areas 100, 200, 300, and 400 would contain the equipment and piping to perform the three process steps of fermentation, recovery, and purification. Clean-in-place operations would also occur in these areas.

Area 100 – Media Mix

The operations to be performed here are the first steps in fermentation. The materials to be handled during normal operations are not flammable or hazardous to health. They include nutrient mixes, media, and substrate solution (30% glucose). Hazardous chemicals would be used in this area during routine clean-in-place (CIP) operations.

Area 200 – Fermentation

The materials to be handled here during normal operations are not hazardous, except for caustic and acid added to the fermenter vessels to control pH. Hazardous chemicals would also be in this area during CIP operations.

Area 300 – Recovery

The materials to be handled here during normal operations are primarily buffers (trisodium phosphate, sodium dihydrogen phosphate, disodium phosphate, etc.) which are nonflammable solids with low toxicity. These chemicals would be handled and mixed as solids. Hazardous chemicals would also be present in this area during CIP operations. In addition to the central CIP system, a small dedicated CIP system would be installed to service the larger ultrafilter (UF-301). Design parameters for this small system are not available at this time, but the chemicals used would be similar to those in the larger central system and would be present in much smaller volume.

Area 400 – Purification

Some flammable chemicals may be handled during buffer preparation and purification. Chemical fume hoods would be provided for this purpose. The CIP system in this area is similar to, but smaller than the one in Area 200.

Although not specified in the Jacobs Engineering preliminary design, High Pressure Liquid Chromatography (HPLC) would be used as a purification step. The solvent for this step is acetonitrile, which would be stored in 55-gallon (200 liter) drums. Acetonitrile may enter the body if it is inhaled or absorbed through the skin. It is a chemical asphyxiant and interferes with the body's ability to use oxygen.

Clean-in-Place. The clean-in-place (CIP) process is common to the four process areas noted above: Media Mix (a preliminary step to fermentation), Fermentation, Recovery, and Purification. Three separate central CIP systems would be included in the facility, with the Fermentation CIP system also serving the Media Mix area. Recovery and Purification areas are each served by central CIP systems. The Purification area would also have a small dedicated system for cleaning the large ultrafilter.

The purpose of the CIP process is to ensure complete cleaning of the piping and vessels between batches. The process consists of seven steps involving two hazardous chemicals, 50% sodium hydroxide (diluted to 1%) and 75% phosphoric acid (diluted to 0.15%), both of which are strongly irritating and may produce chemical burns to exposed eyes or skin. The concentrated chemicals would be stored in tanks (400 liter in the Fermentation and Recovery areas and 100 liter in the Purification area). The larger (400 liter) tanks would be filled by a closed system from Area 800 (described in Chapter 3) and have high level alarms and shut offs to prevent overflowing. The smaller (100 liter) tanks would be manually filled. The discharge of acid and caustic from the Fermentation and Recovery area CIP system would be to the neutralization tanks in Area 800 (see discussion of waste treatment and tank storage). The Purification area CIP system would discharge directly to the utility drain (see Utilities Systems).

Chemical Inventory. A list of chemicals to be stored in the process area was developed from information supplied by Chiron. The amounts to be stored, which represent a two-week supply, are shown in Table 4.2-1. They do not include chemicals to be stored in bulk, which are discussed subsequently. Of the chemicals listed, the most hazardous are pyrogallol and sodium azide; they are stored in very small quantities.

The small quantities of hazardous materials stored in the process area pose a lesser hazard than the chemicals in bulk storage tanks.

Area 500 and 600 — Mammalian Cell Culture

These areas would be used for the manufacture of more complex recombinant proteins in mammalian cell cultures in cases where the products cannot be satisfactorily produced in yeast or bacteria. The mammalian cell culture operations are expected to involve several bioreactor (fermenter equivalent for animal cells) technologies and would be equipped to grow recombinant cell lines up to the equivalent of 200 liter pilot scale batches. Similarly product recovery and purification technologies would be distinct from, but analogous to, the manufacturing processes employed for yeast and bacteria.

Thus, since the process operations, materials used, and facility design, although on a somewhat smaller scale, would be essentially identical or very similar to that described

TABLE 4.2-1
CHEMICALS TO BE STORED IN PROCESS AREA

<u>Chemical</u>	<u>Quantity</u>
Sodium chloride (table salt)	1,200 kilograms
Acetic acid (active ingredient in vinegar)	800 liters
Disodium phosphate (buffer compound)	450 kilograms
Trisodium phosphate (buffer compound)	175 kilograms
Sodium dihydrogen phosphate (buffer compound)	160 kilograms
Pump oil (flammable)	200 liters
Sodium hydroxide (caustic)	100 kilograms
Methanol (wood alcohol)	350 liters
Ethanol (alcohol)	350 liters
Trifluoroacetic acid (strong acid)	150 liters
Acetonitrile (solvent)	350 liters
Pyrogallol (poison)	0.2 grams
Sodium azide (explosive)	0.2 grams

above for yeast (and bacterial) fermentation and product purifications (Areas 100, 200, 300, 400), the potential risks from hazardous chemicals will also be as described above and/or as further discussed below. Also, waste treatment, bulk storage and utilities systems in support of mammalian cell culture would probably be in common with those described and discussed below (Areas 800 and 900), or if separate and dedicated, of virtually identical design and operation.

Area 700 ~ Laboratories

The laboratories area would provide the quality assurance and quality control and some process development functions. Laboratory chemicals would be used, for example, as components of solvent systems for the extraction and purification of nucleic acids such as DNA, and for the analysis of research material by high performance liquid chromatography (HPLC). The extraction and purification operations would be performed routinely on a small scale usually utilizing less than one liter of any hazardous material per protocol. The HPLC analysis nominally utilizes two to three liters of solvents per protocol.

The laboratories are the only areas where radioactive materials would be used and stored within the Pilot Plant. Radioactive materials would be used principally if not solely for analytical testing purposes. These activities would be performed as part of chemical tests on product material samples withdrawn from reaction vessels during fermentation, cell culture or purification steps. These operations would require the storage of a small fraction (usually less than 1% at any one time) of the licensed possession limits for Chiron as defined by the California Department of Health Services (DHS) and involve the use of much less than this during any single operation.

The use of radioactive materials is regulated by the California DHS. Table 4.2-2 shows the maximum allowable usage of radioactive isotopes by all Chiron Corporation facilities in California, together with the expected annual usage at the Pilot Plant. Chiron's current and expected future use of radiological materials in manufacturing operations represents a small fraction of the allowable amounts.

TABLE 4.2-2
ESTIMATED STORAGE AND USE OF RADIOLOGICAL MATERIALS
AT THE PROPOSED PILOT PLANT

<u>Isotope</u> ¹	<u>Inventory</u> (mCi) ³	<u>Annual Usage</u> (mCi)
Hydrogen (³ H)	0.33	2
Phosphorus (³² P)	1.0	6
Iodine (¹²⁵ I)	0.085	0.51

Notes:

¹ Isotope refers to a form of an element; the superscript number is the atomic weight.

² Source: Chiron Corporation (Thomas G. Sanders, Ph.D., Manager, Business Development) letter of January 13, 1989, Attachment 18. Based on current usage for analytical purposes by the existing Chiron Quality Control/Quality Assurance Department.

³ mCi = millicurie, a unit of radioactivity. A residential smoke detector uses 0.001 mci; the radiation equipment used in hospitals to treat cancer use 3,000,000 to 5,000,000 mci or more.

Area 800 - Waste Treatment and Bulk Storage

Waste Treatment. Waste streams would be segregated according to compatibility, prior to collection. A 9,000-liter solvent waste tank would collect wastes from chemical fume hood drains and from the Purification area. These solvent wastes would be primarily a mixture of water and acetonitrile from High Pressure Liquid Chromatography in the Purification area. These wastes would be removed by truck and then to an appropriate hazardous waste treatment facility.

Waste streams outside the pH range of 5 to 9 (i.e., waste that is either too acidic or too basic), such as those generated by CIP operations, would be collected in two neutralization tanks (48,000 liters each). Each tank would hold two to three days of waste. The tanks would be batch neutralized by the addition of sulfuric acid or sodium hydroxide from two 390-liter storage tanks.

A 27,000 liter blending basin would collect the neutralized discharge of both tanks and the utility drain system for final testing prior to discharge to the sewer system. The two neutralization tanks will be alternated daily, with one filling as the other is being treated. In case of plant upset, i.e., a release of concentrated acid or base into the utility drain, the blending basin can also be neutralized.

Bulk Storage. Four bulk storage tanks would contain 93% sulfuric acid, 75% phosphoric acid, 50% hydrochloric acid and 50% sodium hydroxide. Each tank would have a capacity of 15,000 liters. The tanks would be filled from tank trucks. Each bulk hazardous chemical storage tank would have a separate dike provided to contain potential spills or leakage. These tanks are pressure rated vessels which would withstand substantial potential impact (e.g., from loss of support) without massive rupture.

The caustic (sodium hydroxide) tank would be located with adequate distance from incompatible chemicals and would be separated by a dike and sump. The waste solvent tank would also have a separate dike and sump. The dikes would be designed to hold the contents of one tank and six inches of rainwater.

Area 900 – Utilities Systems

Utilities would be contained in Area 900, and include systems for process steam, pure steam, chilled water, chilled propylene glycol, vacuum, compressed air, pure water, deionized water, and a heating, ventilating and air conditioning system. The two steam boilers would be fueled by natural gas. The deionized water system would require hydrochloric acid and sodium hydroxide in 390-liter day tanks. No other hazardous chemicals would be present.

IMPACTS

Operational Impacts

Because hazardous chemicals and radioactive materials would be used in the Pilot Plant, the building and equipment would be designed to avoid their release to the environment and to minimize the exposure of workers. During normal operations the only pathway by which untreated hazardous chemicals would leave the Pilot Plant would be by tanker truck. The tanker trucks would convey the solvent wastes to an appropriate hazardous waste treatment or disposal facility. Because any such facility must meet stringent environmental regulations, no adverse environmental effects would result from Chiron's solvent waste disposal practices on an operational basis.

Acidic or basic wastes would be pretreated by blending or neutralization before discharge to the municipal sewer system. Release of treated waste to the sewer system would occur only after testing to ensure that the discharge would be in compliance with the pretreatment requirements of the sewage agency, East Bay Municipal Utility District. The pretreatment requirements prohibit the discharge to the sewer of any substances that would interfere with the operation of the sewage treatment plant or would make it difficult for the treatment plant to meet its own discharge requirements. Compliance with the pretreatment requirements would ensure that Chiron's waste would not adversely affect the aquatic environment.

Exposure of workers to hazardous chemicals would be limited by equipment design, documentation of safe procedures and training. Nevertheless, workers handling hazardous chemicals would always have some, albeit limited, exposure as a result of minor leaks or spills.

The most hazardous operation during normal plant conditions would likely be the filling of acid and caustic storage tanks. These chemicals are incompatible and can react together explosively. Since the tanks are physically separated and have separate dikes and sumps, the hazard from potential contact between acid and caustic would not be significant.

Potential Accidental Impacts

The facilities would be designed to minimize the effects of reasonably predictable accidents. The more severe accident possibilities would be associated with the bulk storage of hazardous chemicals. The bulk storage tanks would be surrounded by dikes that could contain the contents of a single ruptured tank without allowing hazardous chemicals to drain out of the Pilot Plant building and its immediate surroundings. Without containment structures of this sort, hazardous liquids would drain to the local storm sewer system and into San Francisco Bay and the Emeryville Crescent via Temescal Creek.

Another type of hypothetical accident would be a fire in a laboratory that might release radioactive materials through the fume hood. For its Bay Center Facility, Chiron contracted with Scientific Applications International Corporation to evaluate worst case accident scenarios resulting from fires in fume hoods and radiological releases at Chiron's existing Bay Center plant. None of the scenarios studied resulted in significant exposures to chemicals or radiological materials. The assumptions made in the radiological release scenarios included a usage rate of iodine (^{125}I) of 1.0 millicuries (mCi) per week, or 52 millicuries (mCi) per year. However, the estimated usage of the Chiron Pilot Plant (manufacturing and quality control and quality assurance) is 0.51 mCi per year, or 1% of the assumption for Bay Center. Therefore, the potential accidental release of radiological materials under a similar scenario at the Pilot Plant would be an insignificant risk.

MITIGATION

Plant Operations

Reduction of potential worker exposure to hazardous chemicals or radioactive materials during normal working conditions requires sound operating procedures and an adequate training program. Chiron has a Handbook for Safe Use of Radioisotopes and Radiation Safety Procedures Posting. A review by an independent Certified Industrial Hygienist, of

the guidelines contained in the manual resulted in an additional recommendation to require a documented formal training program for all radiation workers.¹

The contents of Chiron's 1988 chemical safety training seminar was revised as part of this report and was judged adequate from a safety standpoint. Documentation of initial training and periodic refresher training is recommended.

Accidental Occurrences

Proposed as part of the project, Chiron would update its Contingency Plan to include the new facility. The Contingency Plan would be designed to minimize hazards to human health and the environment from fires, explosions, or any sudden or non-sudden release of hazardous materials to the air, soil and water. The provisions of this Plan would be carried out immediately by designated facility personnel in the event of an emergency caused by a release of any hazardous chemicals or biological materials. Arrangements would be made with the Emeryville Fire Department, the Police Department and local hospitals to coordinate necessary emergency services.

In summary, the risks from the use of hazardous chemicals and radioisotopes would be reduced to insignificance by following the proposed mitigation measures.

¹ Keil, Charles, L., Certified Industrial Hygienist, Chemical and Radiological Materials Report, ERM West, February, 1989. (Included as Appendix D)

4.2.3 PUBLIC HEALTH AND SAFETY

SETTING

Two parcels are involved in the project site, both of which were formerly owned by Judson Steel Corporation. This land, and adjacent land to the south, previously contained Judson Steel's operations since the company was founded in 1882. The primary use of this site was to store and melt scrap iron used in production of steel reinforcing bars.¹ Although the site is now cleared, concern over public health stems from the presence of contaminants which may have entered the soils during Judson Steel Corporation's tenure.

Formerly tideland, the project site has been filled with about eight to ten feet of highly variable material, including asphalt, aggregate base, and a heterogeneous mixture of metals, gravel, clay, sand, brick and wood. This material overlies 10 to 20 feet of Bay Mud which in turn covers 30 feet of Merritt sand. Subsurface geologic information was confirmed by drilling performed as part of an Earth Metrics, Inc. site-specific assessment in 1987, and is further discussed in Section 4.8, Geology, Soils and Seismicity.

Depth to groundwater at the project site is between 3.5 and 8 feet. Contact with groundwater may occur during excavation for the project, and its quality is therefore of interest. The public does not receive drinking water from any aquifer in the vicinity of Emeryville; therefore, the possible presence of hazardous contaminants in the groundwater poses no threat to drinking water supplies. Also, geologic factors limit the possibility that contaminants on-site could migrate through surface or subsurface water transport. First, the project site is not within the 100 year flood zone and is not subject to significant erosional forces. Second, Bay mud is extremely clay rich and is virtually saturated with mineral bound water, and there is virtually no vertical water flow through the Bay mud by which contaminants could enter the porous sand formations beneath.² Surface water runoff enters the Bay through channels under Interstate 80, and may transport pollutants off-site.

Environmental Risk Assessment

Soils investigations were performed in August, 1987, by Earth Metrics, Inc., an environmental consulting firm, and soil samples were analyzed for halogenated hydrocarbons, total hydrocarbons, pH, and 17 metals listed in the California Code of

Regulations, Title 22. Title 22 provides State criteria for the identification of hazardous wastes, including a two-step procedure for analyzing the hazardous components in a sample, including concentration by weight (Total Threshold Limit Concentration) and concentration after extraction and solution in an acidic liquid (Soluble Threshold Limit Concentration).

Earth Metrics compared the concentration of various metals in the soils to the corresponding Total Threshold Limit Concentrations (TTLC) in Title 22. Testing revealed that metals, including cadmium, chromium, lead, and zinc, were present at relatively high levels on the site. The Earth Metrics report concluded that this contamination might be expected due to the nature of Judson Steel's prior operations (i.e., slag and mill scale disposal). Of the ten samples that were examined, only one exhibited an elemental concentration which exceeded the allowable TTLC value: Zinc was found at 5,320 mg/kg, while the TTLC for zinc is 5,000 mg/kg. This means that this soil sample is a hazardous waste as defined by California regulations. Total chromium and lead levels approached TTLC levels at one testing site each.³ These levels indicate that the soil sample might exceed Soluble Threshold Limit Concentrations (STLC) if subjected to a Waste Extraction Test (WET), and samples taken nearby might exceed TTLC limits.⁴

In situations in which metal concentrations approach, but do not exceed, TTLC values, California Administrative Code, Title 22, Section 66700(b) requires that the Waste Extraction Test (WET) be carried out on the waste. The purpose of this test is to determine if the metals concentrations exceed the Soluble Threshold Limit Concentrations (STLCs) in Title 22. As described in the Mitigation Measures section, the County Department of Environmental Health will determine if any further testing is necessary.

Sample analysis also revealed generally high pH values for soils at the project site which are attributable to the previous land use. Lime storage and fugitive lime dust may have contributed to the soil's alkalinity.⁵

Organic halogens were found in three of the original sampling sites. This chemical group includes polychlorinated biphenyls (PCBs), which are carcinogenic and accumulate in the human body. Analysis of another eight soil cores for the presence of PCBs was performed

subsequently and the maximum detected levels were less than the allowable California TTLC for PCBs.

Finally, of seven core samples tested for total petroleum hydrocarbons, Earth Metrics reported that five were below the detection limit and the remaining two were below the relevant TTLCs.

Regulatory Authority

In Emeryville, the Alameda County Department of Environmental Health (DEH), through a Memorandum of Understanding, has the authority to implement California laws and regulations which are within the jurisdiction of the California Department of Health Services and the Regional Water Quality Control Board, San Francisco Bay Region. Thus, DEH is the agency which is responsible for supervising any hazardous waste investigations or cleanups at the site.

IMPACTS

The significance of the public health risk is determined by the probability of construction workers or members of the general public being exposed to hazardous substances in sufficient concentrations to cause adverse health effects. California regulations in Title 22 and the Code of Federal Regulations (40 CFR Part 261) define what is considered hazardous, and therefore dangerous to handle.

Since metals and PCBs may be present in significant concentrations in soils on the project site caution during construction is appropriate. During project construction, excavated soil could present a hazard of exposure to workers and the surrounding community. Also, construction activities may include dewatering which could bring potentially contaminated groundwater to the surface.

After completion, the contaminated soils could present a significant hazard to users of the Temescal Creek Park and other landscaped areas. Workers eating lunch or children playing in the park could accidentally ingest contaminated particles of soils. If encapsulated by parking lots or buildings or clean soil, the possibility of ingestion would be reduced to insignificance.⁶

Underground Fuel Tank

The project site formerly contained a 3,000-gallon underground storage tank which was removed by Crown Environmental in May, 1988. At the time of removal, soil samples were taken as required by Health Department regulations, and an analysis was performed. The tank contained less than one gallon of residual liquid which also was analyzed. H&H Ship Service Company of San Francisco later received and disposed of the tank according to regulatory requirements.

Soils samples testing revealed the presence of petroleum hydrocarbons at levels far below threshold levels which would necessitate further action. The residual liquid was identified as water with traces of diesel fuel. No evidence was found to indicate that the tank had leaked at any time. Therefore, no significant impacts have been identified in relation to the removed tank.

MITIGATION MEASURES

The following mitigation measures shall be implemented according to the direction of the Department of Environmental Health. These measures are the process by which the DEH manages a contaminated site.⁷

- 1) The developer shall prepare a soils Sampling Plan based upon historical industrial uses of the site. (A preliminary sampling plan is included in the Earth Metrics study.)
- 2) The Sampling Plan shall be reviewed and approved by the DEH. The Plan shall include all revisions imposed by DEH.
- 3) The project proponent shall implement the Sampling Plan and transmit the results to the DEH. (Again, a preliminary sampling program has been conducted and results communicated to the DEH.)⁸
- 4) If contamination levels are at or near thresholds set by California regulations (California Code of Regulations, Title 22) or relevant federal law, the project sponsor shall meet with the County DEH, the City Manager and Attorney, and other relevant City staff to determine whether further action, including whether additional testing would be necessary.
- 5) If contamination exceeds State and/or federal threshold levels, the project proponent shall prepare a Plan of Correction.
- 6) The Plan of Correction shall be reviewed and approved by the DEH. The Plan shall include all revisions imposed by DEH.

- 7) Upon acceptance, the project sponsor shall implement the Plan of Correction, and provide written verification of its completion to DEH and the City.
- 8) The DEH shall specify appropriate protective clothing for construction workers, if necessary.

Implementation of these mitigation measures would reduce the potential risk to public health to a less than significant level.

Similar alternatives exist for remediating potential exposure to contaminated groundwater. If found to be hazardous, water produced during construction would require caution in handling, and treatment prior to discharge. Regional Water Quality Control Board standards for discharged water would apply. The DEH would supervise implementation of any necessary mitigation for groundwater contamination.

¹Earth Metrics, Inc., "Environmental Risk Assessment for the Judson Steel Site," September 1987, p. 1.1-1.

²Lee, C.H. and M. Pratszker, "Bay Mud Developments and Related Structural Foundations," in Geologic and Engineering Aspects of San Francisco Bay Fill, H. B. Goldman, ed., California Division of Mines and Geology, Special Report No. 97, 1969, p. 45.

³Op. cit., Earth Metrics Inc., 1987, p. 1.5-1. Soils samples were taken at ten sites on the parcels which would house the Shellmound Park and the adjacent Chiron Pilot Plant to the south. The Earth Metrics report did not examine results in terms of two proposed projects, however, and some assessment results and conclusions are therefore discussed here which include data generated from the Pilot Plant site. A separate discussion of public health issues is included in the Pilot Plant EIR.

⁴Ibid., p. 1.5-1.

⁵Ibid., p. 1.5-6.

⁶The Earth Metrics report suggested several remediation measures. These included paving the site and putting 18 inches of clean fill over the contaminated soils, where landscaped. However, this would not mitigate the exposure of workers to hazardous soils during excavation and grading. Also if soils were removed from the site, the developer would have to treat them as hazardous wastes, e.g., such soils would have to be taken to a Class I Treatment, Storage and Disposal Facility.

⁷Personal Communication with Susan Adams, City Attorney, June 6, 1989.

⁸Personal Communication with Mark Papineau, Project Manager, Earth Metrics, June 6, 1989.

4.3 TRANSPORTATION

INTRODUCTION

The proposed project is located on the west side of Shellmound Street south of the Powell Street Shopping Plaza. The site is adjacent to the Eastshore Freeway (Interstate 80). Site access will be provided from Shellmound Street. Currently, Shellmound Street terminates just south of the project site. Thus, site access will be entirely oriented to the north on Shellmound Street, with further access provided by Powell Street, Interstate 80, and Christie Avenue.

This analysis considers a proposal for development of a pilot manufacturing plant for pharmaceutical products. The facility would be partially two- and partially three-story with 101,700 gross square feet of floor area.

Construction of the proposed project would be completed by late 1990, with full occupancy by late 1991 or early 1992.

Regarding changes in the street access to the site, the City of Emeryville has made proposals to: 1) extend Bay Street south from its current terminus at 65th Street along the west side of the Southern Pacific Railroad to connect with Shellmound Street just south of Powell Street, and 2) to extend Shellmound Street south and east from the project site, crossing the Southern Pacific Railroad, to connect with Yerba Buena Avenue. The City is in the process of spending \$3 million (provided by the Martin Group through the West Emeryville Assessment District) on these projects. Preliminary studies of the proposed Shellmound Street extension are currently underway by the City Engineering staff. One alternative under consideration would extend Shellmound to the south as a two lane arterial. The roadway would turn to the east as an extension of Yerba Buena Avenue and would cross the Southern Pacific railroad tracks at-grade. A second alternative would follow the same general alignment, but would cross the railroad tracks with a grade-separated structure, i.e., an overpass. An optimistic estimate of a construction schedule for the extension shows the earliest likely completion of the at-grade alternative in late 1991, and of the grade-separated alternative in mid-1992.

SETTING

The traffic analysis for this EIR is complex and requires an understanding of future traffic conditions, including planned changes to the Powell Street and I-80 interchange and increased traffic due to other pending projects. This subsection first discusses the existing traffic conditions, then expected conditions in the future, and finally public transportation and bicycle and pedestrian routes.

For purposes of this analysis, the project region was limited to the city limits of Emeryville, since the affected intersections serve this area. The regional freeway system, consisting of Interstate Routes 80, 880, and 580 provides regional access to Emeryville and the project site. An interchange with I-80 at Powell Street provides the primary connection between the freeway and arterial street systems. Secondary freeway/arterial street interface for the project site is provided at the I-80/Ashby and I-580/MacArthur interchanges. Arterial streets providing service to the project site include: Shellmound, Powell, and Hollis Streets, and San Pablo, Ashby, and Christie Avenues.

Existing Traffic Conditions

Traffic counts were made one day during the morning (7:45 to 8:45 a.m.) and evening (4:45 to 5:45 p.m.) peak periods in January, 1989, at the following intersections:

- o Powell Street/I-80 West Frontage Road
- o Powell Street/I-80 west ramps
- o Powell Street/I-80 east ramps
- o Powell Street/Christie Avenue
- o San Pablo Avenue/MacArthur Boulevard/Adeline Street

These counts were made to establish a baseline for the traffic study in terms of existing peak-hour volumes and existing intersection level of service (LOS). The resulting counts are shown in Figure B-1 in Appendix B.

The standard method of measuring traffic congestion on arterial streets is to analyze the volume to capacity (V/C) ratio at each intersection. The V/C ratio is the amount of traffic divided by the ultimate capacity of the intersection; e.g., a V/C ratio of one is

where the traffic volume is equal to the intersection capacity. A V/C ratio of less than one means that the traffic volume is less than the intersection capacity. A V/C ratio greater than one means there are more vehicles than the intersection can smoothly accommodate. The calculated V/C ratio is translated for traffic analyses into intersection levels of service (LOS). Level of service is a letter grade used to describe traffic conditions on roadways. LOS A indicates the best conditions and LOS F the worst.

At signalized intersections, LOS A operations occur when traffic volumes are light, and most motorists receive a green signal indication upon arrival at the intersection or shortly after arrival. Levels B and C represent stable flow. LOS D is defined by heavy traffic volumes for 15 to 30 minutes of the peak hour, and moderately heavy for the remainder. Most motorists are stopped by a red signal indication, but pass through on the next green signal. Some motorists wait through two green indications during the peak 15 to 30 minutes. Level E means that the traffic equals the capacity and there are long queues of vehicles and substantial delays. LOS F marks jammed conditions, where long lines of vehicles form waiting to pass through an intersection, and lines of vehicles extend between more than one signalized intersection. (See Appendix B, Table B-1, for Level of Service Definitions.)

Levels of service were evaluated for the study intersections using the critical lane methodology, the standard capacity technique used by traffic engineers since 1980. The critical lane methodology was developed to simulate traffic patterns as they affect the timing of the green indications at signalized intersections. In general, peak hour traffic is usually heavier in one peak direction. The peak direction traffic will control the length of the green signal time since it requires more green time than the off-peak direction, and is therefore referred to as the "critical" movement. Traffic in the off-peak (opposite) direction will generally receive the same amount of green time as the peak direction, but reduced traffic moving in this direction will not fully utilize the time available.

Estimates of existing levels of service for the morning and evening peak hours are summarized in Table 4.3-1. The interactions among intersections that occur along Powell Street at the I-80 ramp terminals are indicated next to "Coordinated Signal System." These interconnected intersections, when evaluated as a single system, show an evening peak hour LOS E, with a volume to capacity (V/C) ratio of 0.99. This system analysis

TABLE 4.3-1
INTERSECTION VOLUME/CAPACITY RATIOS AND LEVELS OF SERVICE:
EXISTING TRAFFIC VOLUMES

Intersection	V/C Ratio and Level of Service	
	A.M. Peak	P.M. Peak
W. Frontage/Powell	0.43 (A) ¹	0.53 (A)
Southbound I-80/Powell	0.39 (A)	0.62 (B)
Northbound I-80/Powell	0.67 (B)	0.74 (C)
Coordinated Signal System (Frontage/I-80/Powell)	0.89 (D)	0.99 (E)
Christie/Powell	0.48 (A)	0.71 (C)
MacArthur/San Pablo/Adeline	0.58 (A)	0.73 (C)

¹0.43 (A) means Volume/Capacity Ratio = 0.43 and Level of Service A.

reflects the greater amount of "lost time" in unused green time for the off-peak traffic in the signal separation within a diamond interchange, and better reflects the actual conditions experienced at the I-80 ramp terminals. The Powell Street/I-80 interchange is a diamond interchange, which means that there is one freeway on-ramp and one freeway off-ramp for each direction.

Future Traffic Conditions

Future Roadway Conditions. Two alternative future street networks are considered in the report: (1) with the existing I-80/Powell Street interchange (Alternative Road Network 1) and (2) with a modified I-80/Powell Street interchange (Alternative Road Network 2).

The California Department of Transportation (Caltrans) is responsible for improvements to I-80. Caltrans has proposed to modify a number of intersections along I-80 to improve

levels of service. As a part of the proposed I-80 corridor modifications, Caltrans plans to modify the I-80/Powell Street interchange, referred to here as Alternative Road Network 2. Under this alternative, the southbound off-ramp at Powell Street would be moved north from its existing location, turn toward the west (San Francisco Bay) and connect to the Frontage Road. The southbound on-ramp would also be moved north, and would start on the Frontage Road next to the off-ramp terminus. The two ramps would create a new intersection with the Frontage Road near the location of the former Carlos Murphy's restaurant site. The existing southbound on- and off-ramps at Powell Street would be eliminated. Alternative Road Network 2 is shown in Figure 4.3-1.

The ramp relocation proposal would facilitate the movement of southbound traffic accessing the freeway from the on-ramp to I-80. It would also provide simplified signal operations on Powell Street. The heaviest traffic movement in the evening peak hour is from westbound Powell accessing the southbound I-80 on-ramp. This move is currently a signalized left turn and uses valuable signal time at the intersection. Under the proposed Alternative 2 Road Network design, the move would become a "free" right turn, which would proceed independently of the signal and would free the signal to allow better operations for through traffic.

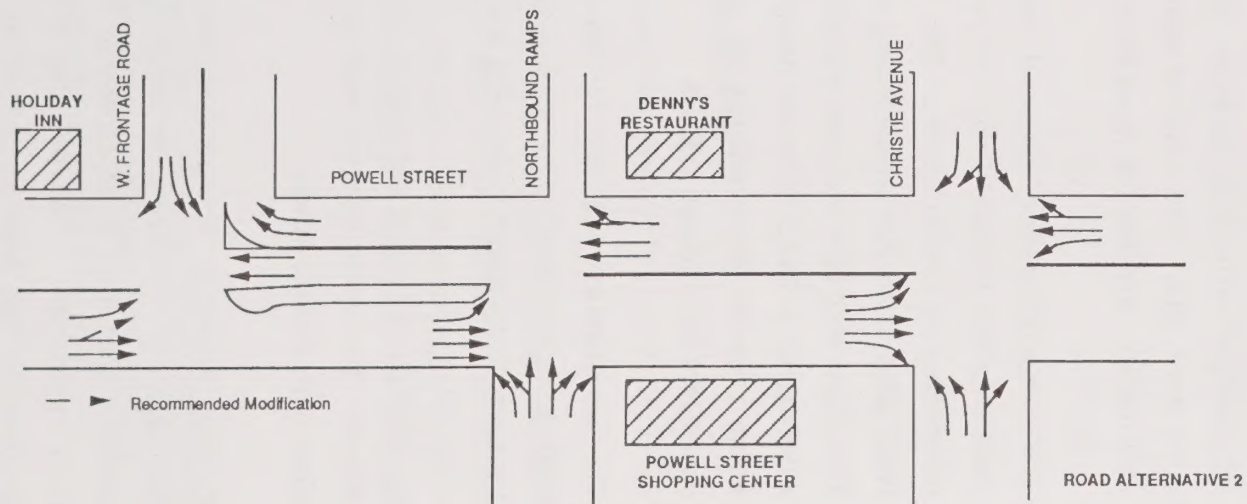
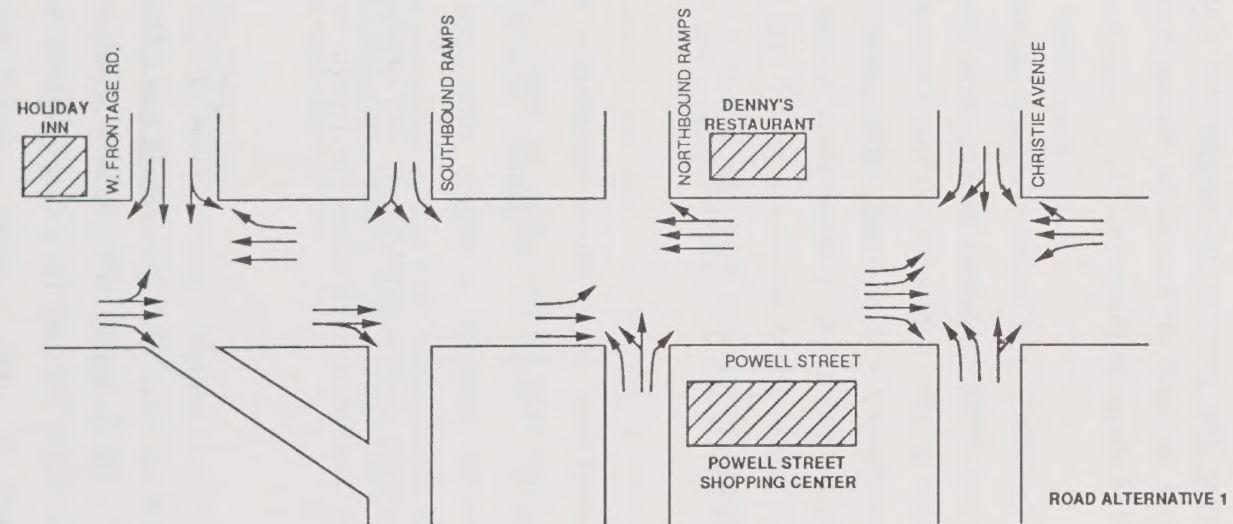
The construction schedule for the proposed new ramps shows completion between mid-1991 and late-1993. The actual completion date is contingent on negotiations between Caltrans and City of Emeryville staff.

In addition, Caltrans has completed restriping on the northbound I-80 offramp at Powell Street. The work involved restriping the center lane to allow for traffic to turn left or right onto Powell Street.

Pending Projects. The pending projects in this analysis include three categories of future developments: projects for which applications have been submitted, but are not approved; projects that have been approved, but not constructed; and projects constructed, but not fully occupied. The pending projects were limited to those projects for which an application had been submitted by March 28, 1989, because a cutoff date had to be established to complete the analysis.

ROAD ALTERNATIVES

FIGURE 4.3-1



SOURCE: CH2M HILL

NOT TO SCALE



It should be noted that applications for several of the pending projects were filed between the date of the design and development approval of the original Chiron Research and Development Park (as explained in Chapter 1) and March 28, 1989. These projects are included in the traffic analysis even though they were filed subsequent to the proposed project.

As the pending projects are approved, completed and/or fully occupied, they will generate traffic in addition to the expected future traffic volumes. Therefore, the pending projects in Table 4.3-2 have been included to form the future baseline of this analysis. Note that the proposed Chiron Pilot Plant, which is the subject of another EIR, is included in the pending projects list. Estimates of trip generation, distribution, and assignment for the pending projects were made and the resulting trips were added to existing volumes at the key intersections under consideration. Pending projects are described in Table 4.3-2. Figure 4.3-2 shows these locations. The total number of trips for each alternative was estimated using the Institute of Transportation Engineers' (ITE) publication Trip Generation (4th Edition). The total traffic that will be generated by the pending projects is shown in Figure B-2 in Appendix B. This document provides data related to tripmaking for individual land uses and for daily and peak-hour travel. Estimated peak-hour trip generation for pending projects is shown in Table 4.3-3. The estimated traffic from the list of pending projects plus the existing traffic volumes plus a background growth factor equals the future baseline traffic volumes. (The background growth factor is discussed below.)

For each land use type (or ITE code) shown in the table, the trip rate is dependent on total project size. Therefore, different rates are shown for the same land use type, because the total size of the project is different. For example, studies have shown that smaller office buildings generate more trips per square foot than large office buildings. Thus, the Bay Center office with a total floor area of 325,000 square feet (sf) would generate 1.63 trips for every 1,000 sf of floor area in the evening peak hour, while the Marketplace Office would generate 1.90 trips per 1,000 sf with its total size of 121,000 sf.

The trip generation rates shown in Table 4.3-3 were calculated from the total project size. The number of trips was then calculated by applying the rates to the unoccupied area. The exception is the Powell Street Shopping Center. The Center caters to evening

TABLE 4.3-2
PENDING PROJECTS
Application Submitted by March 28, 1989

<u>Project</u>	<u>Total Size and Type of Use</u>	<u>Unoccupied as of January 1989</u>
Bay Center	325,000 sf office	20,000 sf
Bay Center 2	525 apartments	223 units
Shellmound Park	175,000 sf office	175,000 sf
Marketplace	91,000 sf retail	65,000 sf
Office	121,000 sf office	121,000 sf
Hotel	154 rooms	154 units
UA Cinema	40,000 sf cinema	40,000 sf
Powell Street Shopping Plaza	160,000 sf retail	27,000 sf
Hollis Street Project	117,000 sf light industrial	35,000 sf
Good Guys	15,000 sf retail	15,000 sf
Hollis Bay Associates ¹	57,000 sf mixed use	42,000 sf
Days Inn Restaurant	10,000 sf full service restaurant	10,000 sf
Heritage Square ¹	96,000 sf mixed use	3,400 ² sf
Emeryville Business Center ¹	130,000 sf mixed use	130,000 sf
Ratcliff Architects	20,000 sf office	20,000 sf
Wareham (South Forty)	29,569 sf R&D	29,569 sf

¹Trips to existing uses (light industrial) are deducted for these sites.

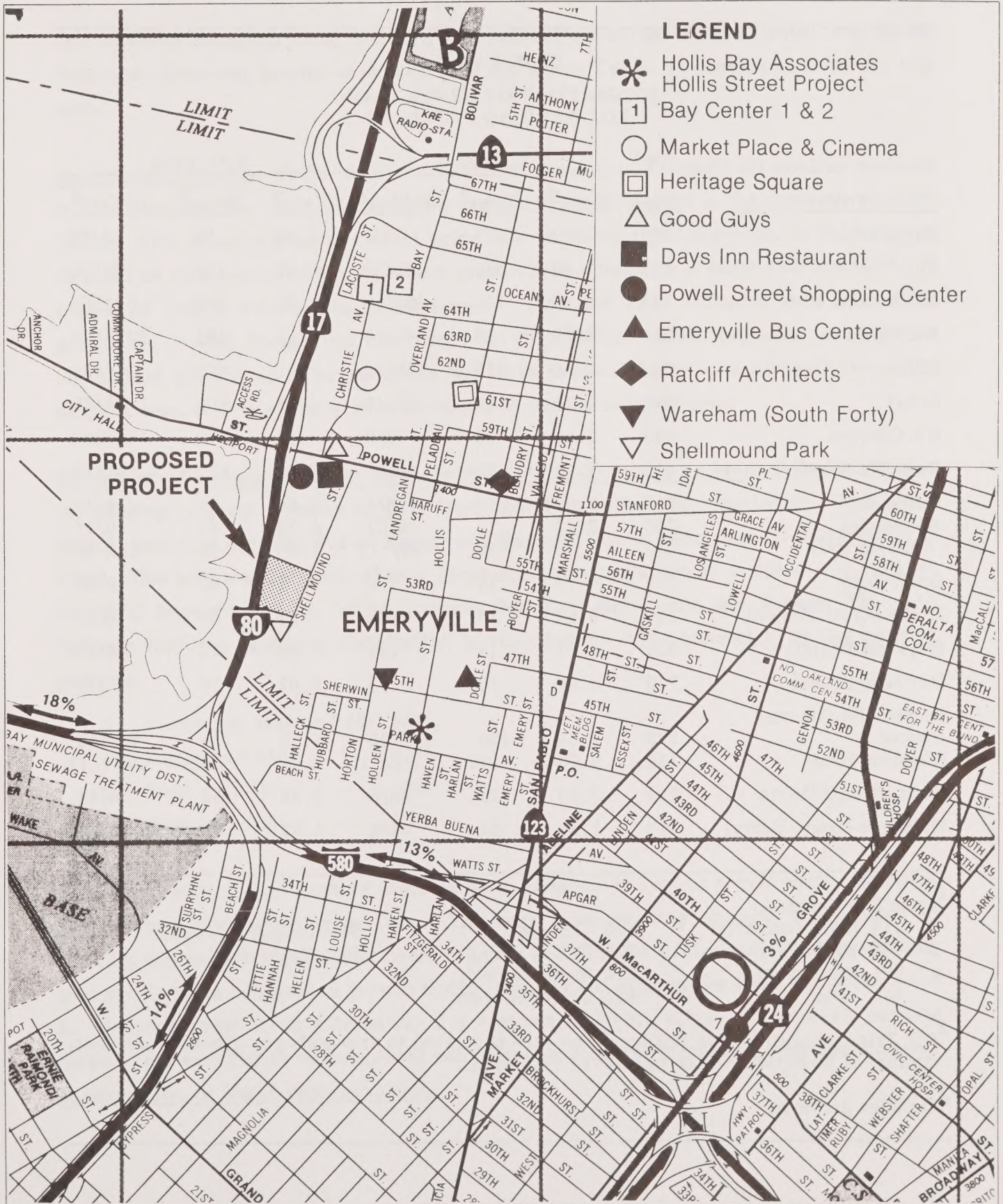
²Unoccupied Office Space.

sf = square feet

R&D = Research and Development

PENDING PROJECTS

FIGURE 4.3-2



SOURCE: EIP ASSOCIATES

NOT TO SCALE



TABLE 4.3-3
ESTIMATED TRIP GENERATION
FOR PENDING PROJECTS

Project	ITE ¹ Code	A.M. Peak			P.M. Peak		
		Rate ²	Trips ³	In/Out ³	Rate ²	Trips ³	In/Out ³
Bay Center	710	1.72	35	30/5	1.63	35	5/30
Bay Center	221	0.52	115	25/90	0.63	140	90/50
Shellmound Park	710	1.86	325	280/45	1.80	315	50/265
Marketplace	815	0.79	50	40/10	6.1	395	205/190
Office	710	1.95	235	205/30	1.9	230	35/195
Hotel	310	0.70	110	70/40	0.66	100	55/45
UA Cinema	443	0.21	10	8/2	6.14	245	145/100
Powell 1 Shopping Plaza	820	2.08	55	40/15	7.71	135	65/70
Hollis Bay	710	2.72	23	20/3	2.85	24	4/20
Associates	150	2.12	71	49/22	0.79	27	10/17
(Existing Use)	110	0.96	-55	-40/-15	1.03	-60	-15/-45
Good Guys	815	0.79	10	7/3	6.1	90	45/45
Hollis Street Project	110	0.96	35	30/5	1.03	35	5/30
Days Inn Restaurant	831	0.91	10	9/1	7.25	70	50/20
Heritage Square	710	2.05	10	8/2	2.02	10	2/8
Emeryville Business Center	770	1.54	200	170/30	1.35	175	35/140
(Existing Use)	110	0.96	-125	-110/-15	1.03	-135	-20/-115
Ratcliff Architects	710	2.50	50	44/6	2.60	52	8/44
Wareham (South Forty)	110	1.88	50	44/6	1.52	45	5/40

¹Land Use Types:

110 Light Industrial
150 Warehouse
221 Apartment
310 Hotel

443 Cinema
710 Office
770 Business Park
815 Discount Store

820 Shopping Center
831 Restaurant

²ITE Trip Generation, 4th Edition. The rate is related to trip ends per gross square feet, number of dwelling units or number of employees.

³Vehicles per hour.

and weekend shoppers; thus, standard calculations would not reflect actual trip rates. Peak hour drive-way counts were taken one day at the Center to provide an accurate trip rate.

Background Growth. While considerable effort was made to include all pending projects in this analysis, the most conservative approach would include a "background growth" factor. This would represent traffic going from I-80 through Emeryville to Berkeley or Oakland or vice versa. The one percent growth rate represents a worst case scenario. A review of traffic volumes collected between 1986 and 1989 indicates that all traffic growth on Powell Street can be traced to City of Emeryville projects. Almost no background growth has occurred in the last three years. However, to estimate the worst possible case, traffic volumes were increased by one percent per year.

Estimation of Future Levels of Services Without the Proposed Project. Trip distribution for pending projects is based on data from the Metropolitan Transportation Commission (MTC), including the 1983 Travel Survey and Regional Travel Characteristics (Appendix 6, 1980). This information provided data about commuting patterns by residents and workers for MTC Superdistrict 19, which includes Berkeley, Emeryville and Albany. The data indicate that the following distribution is expected for trips generated by the pending projects:

- o North and east on I-80: 55%
- o South on I-880: 14%
- o West on I-80: 18%
- o East on I-580: 13%

Trips generated by the pending projects were assigned to logical travel routes based on the above trip distribution pattern. The trips from pending projects were added to existing volumes at key intersections. Figures B-3 and B-4 in Appendix B show existing plus pending plus background growth traffic volumes for Alternative Road Networks 1 and 2. Volumes under Road Alternative 2 are shown in Figure 4.3-1. Because all pending projects are assumed to be completed and fully occupied, the traffic analysis constitutes a conservative, or worst-case, condition.

Based on the estimated traffic volumes, levels of service were calculated. Estimated intersection levels of service (LOS) for existing and pending projects and background growth are shown in Table 4.3-4. Under Alternative Road Network 1 (the existing configuration), three intersections will deteriorate to a LOS E condition due to impacts of the pending projects. Analysis of the intersections on Powell Street at I-80 as a system produces an estimated LOS F for Alternative Road Network 1 during the evening peak hour, with a volume/capacity ratio of 1.14 and during the morning peak ($V/C = 1.08$). With Road Alternative 2, LOS D operations would be expected during the p.m. peak and LOS A during the a.m. peak. The combined effect of the pending projects (i.e., not including Shellmound Park) would be considered significant in its impact on local traffic conditions under Alternative Road Network 1, i.e., the existing roadway configuration.

Public Transportation

The project site is served by bus with connections from the Bay Area Rapid Transit (BART). The AC Transit bus system provides several routes in Emeryville, including the 57 and 57M (Marina) lines which run along Powell Street and which offer the most direct access to the site of the proposed project. Currently, the 57M stops at the intersection of Shellmound Avenue and Powell Street at 20 minute intervals during commute periods and at 30 minute intervals during other daytime hours. The 57 route proceeds east on Powell Street to San Pablo Avenue, and reaches the MacArthur BART Station via 40th Street and Broadway Street. Connections to other AC Transit routes, such as line 72, may be made at San Pablo Avenue.

AC Transit is in the process of conducting a major route restructuring study. The results of the study will be submitted to AC Transit the Board of Directors and approved service changes would take effect over a one-year period beginning in December, 1989. As proposed, the 57 and 57M routes would become one route which would offer more frequent service to the project site area. During commute hours, buses would run every ten minutes and the normal daytime frequency would increase to 15 minutes.

Bicycle and Pedestrian Routes

Shellmound Street is not a throughway and does not receive significant bicycle or pedestrian traffic. The nearby Powell Street intersection, however, is used by both

TABLE 4.3-4
ESTIMATED INTERSECTION VOLUME/CAPACITY RATIOS AND LEVELS OF SERVICE:
EXISTING PLUS PENDING PROJECTS

Intersection	Road Alternatives			
	Alternative 1		Alternative 2	
	A.M. Peak	P.M. Peak	A.M. Peak	P.M. Peak
West Frontage/Powell	0.51 (A) ¹	0.54 (A)	0.55 (A) ²	0.65 (B) ²
Southbound I-80/Powell	0.40 (A)	0.61 (B)	N/A	N/A
Northbound I-80/Powell	0.83 (D)	0.94 (E)	0.54 (A)	0.71 (C)
Coordinated Signal System	1.08 (F)	1.14 (F)	0.52 (A)	0.84 (D)
Christie/Powell	0.63 (B)	0.95 (E)	0.63 (B)	0.95 (E)
MacArthur/San Pablo/Adeline	0.61 (B)	0.78 (C)	0.61 (B)	0.78 (C)

¹0.51 (A) means Volume/Capacity Ratio = 0.51 and LOS A.

²For Road Alternative 2, the intersections of the West Frontage Road and southbound I-80 ramps at Powell are combined.

cyclists and pedestrians. Christie Avenue is the designated bicycle route in the area. Where Powell Street passes over the Southern Pacific railroad tracks, pedestrians and bicyclists are currently prohibited.

The City of Emeryville recently passed General Plan amendments which delineate bicycle and pedestrian corridors throughout the area. The amendments provide for a segregated pedestrian walkway and bicycle lane on Shellmound Street as well as connections to Powell Street. The proposed project would be consistent with the General Plan amendments for pedestrian and bicycle lanes on Shellmound Street. Eventually, pedestrian and bicycle circulation paths extending west to the waterfront area and north toward Berkeley

would also be established per the General Plan. Financing for improvements will be negotiated between the City and private developers.

IMPACTS

For the purpose of this analysis, significant impacts are identified by any one of the following criteria:

- o Degradation of any intersection or network to a level of service of E or F.
- o Creation of a demand on public transportation greater than levels currently projected and planned for.
- o Exposure to pedestrians or bicyclists to high health and safety risks.

Trips for the proposed pilot plant were estimated from the ITE rates for each scenario. Trip generation has been estimated for each roadway option, and the results are summarized in Table 4.3-5. Trip distribution for the proposed project would be the same as for the pending projects previously described.

Both road networks have been used as a baseline to illustrate project impacts on the key intersections under investigation. The projected traffic generation from the proposed Pilot Plant has been added to existing levels plus background growth plus pending project traffic volumes for both road alternatives. The resulting traffic volumes are shown in Figures B-5 and B-6 in Appendix B.

At the two critical intersections (Powell/Christie and Powell/I-80 northbound ramps), levels of service during the evening peak hour are projected to deteriorate with or without development of the project. At the Powell/Christie intersection, the proposed project would contribute 8.5% of total traffic entering the intersection. The project contribution at the Powell/I-80 northbound ramps would be about 9.0%.

The level of service (LOS) analysis is summarized in Table 4.3-6. Under Road Alternative 1, the intersection of Powell Street with the northbound I-80 onramp is projected to operate at capacity during the evening peak hour. This intersection also causes LOS F operations for the I-80/Powell Street interchange system. At the northbound I-80/Powell intersection, the movements affected by the project include the northbound right turn

TABLE 4.3-5
ESTIMATED PILOT PLANT PROJECT TRIP GENERATION

<u>Use</u>	<u>Units</u>	<u>Daily</u>		<u>Morning Peak Hour</u>			<u>Evening Peak Hour</u>		
		<u>Rates</u>	<u>Trips</u>	<u>Rates</u>	<u>Trips</u>	<u>In/Out</u>	<u>Rates</u>	<u>Trips</u>	<u>In/Out</u>
Below Average	82 Employees	0.75	60	0.14	10	10/0	0.13	10	0/10
Average	82 Employees	2.45	200	0.47	40	35/5	0.44	35	5/30
Above Average	82 Employees	4.15	340	0.80	65	55/10	0.75	60	10/50

TABLE 4.3-6
ESTIMATED INTERSECTION VOLUME/CAPACITY RATIOS
AND LEVELS OF SERVICE: EXISTING, BACKGROUND GROWTH,
PENDING PROJECTS PLUS PROPOSED PROJECT

Intersection	Road Alternatives			
	Alternative 1		Alternative 2	
	A.M. Peak	P.M. Peak	A.M. Peak	P.M. Peak
West Frontage/Powell	0.51 (A) ¹	0.54 (A)	0.62 (B) ²	0.66 (B) ²
Southbound I-80/Powell	0.46 (A)	0.67 (B)	N/A	N/A
Northbound I-80/Powell	0.93 (E)	1.00 (E)	0.59 (A)	0.77 (C)
Coordinated Signal System	1.23 (F)	1.21 (F)	0.57 (A)	0.90 (D)
Christie/Powell	0.68 (B)	1.04 (F)	0.68 (B)	1.04 (F)
MacArthur/San Pablo/Adeline	0.62 (B)	0.78 (C)	0.62 (B)	0.78 (C)

¹0.51 (A) means Volume/Capacity Ratio = 0.51 and LOS A.

²For Road Alternative 2, the intersections of the West Frontage Road and southbound I-80 ramps at Powell are combined.

onto eastbound Powell Street and the through and right turn movements along westbound Powell Street. A system analysis of the three intersections on Powell Street at I-80 indicates LOS F, with a volume/capacity ratio of 1.21. In the absence of mitigation, these impacts would be significant.

For Road Alternative 2, i.e., after Caltrans modifies the freeway interchange, the northbound ramp intersection shows LOS C operations in the p.m. peak hour. The improved LOS stems from a proposed additional eastbound through and northbound right turn lanes at the intersection (see Figure 4.3-1). The expected operation of the coordinated signal system is also acceptable.

For both Road Alternatives, the Powell/Christie intersection deteriorates from LOS E to LOS F with addition of project traffic, also a significant impact. At the MacArthur/San Pablo/Adeline intersection the expected LOS is C. Addition of project traffic does not cause the LOS or volume-to-capacity ratio to change, so the project impacts at this intersection would not be considered significant.

Regarding freeway traffic volumes, the project alternatives would produce a maximum increase in volume on I-80 south of Powell Street of 205 vehicles per hour (vph) during the morning peak and 130 vph during the evening peak. Total peak-hour traffic volume in this area currently is about 25,000 vph, and is capacity-constrained for several hours of the day.

On I-80 north of Powell Street, the project would contribute up to 140 vph in the morning peak and 190 vph in the evening peak. Total peak-hour traffic volume here is about 24,100 vph.

The evaluation of project-generated traffic volumes described above are based on average trip generation rates published by the Institute of Transportation Engineers. Individual projects that ITE studied to determine the average rates were above and below the average. To provide a range of potential traffic impacts due to the project, the City requested that two additional trip generation scenarios be developed – one standard deviation above and below the average trip generation rates ("high" and "low" trip generation). This type of analysis is not typically conducted within a conventional traffic impact study because it represents an extremely unlikely occurrence. The high and low rates are approximately 25% higher or lower than the average rates.

A level of service (LOS) analysis was performed for the project high and low trip generation scenarios for Alternative Road Network 1 at the two critical intersections where congestion has been indicated by previous LOS evaluations. The volume/capacity ratio varies by 0.01 to 0.05 for the various combinations of peak hours and intersections. The results of these analyses are shown in Table 4.3-5 and Table B-2 in Appendix B.

The development of the proposed project would increase ridership on public transportation systems. Specifically, AC Transit service to the project site would receive greater

demand. The exact number of employees at the proposed project who would utilize bus and BART systems is unknown. Various factors such as driving distance and convenience of public transportation would determine the number electing not to drive personal vehicles.

Vehicular traffic from project employees would present a slightly increased hazard to pedestrians and bicyclists in the immediate area of the proposed project.

Construction Impacts

Traffic impacts during construction of the project will consist of commute trips by construction workers and truck trips for delivery of construction materials and equipment. Maximum employment of construction workers is estimated at less than one-fourth the employment of the completed project. Commute trips would also be less than one-fourth the completed project traffic, and thus would be considered a minor impact.

MITIGATION MEASURES

Mitigation measures are required when addition of project traffic causes levels of service at intersections to drop below LOS D. Some intersections would deteriorate to unacceptable LOS with or without the proposed project. Therefore, the project sponsor should not be solely responsible for the mitigation measures suggested below. The project sponsor should be expected to contribute a representative share to any assessment district formed by the City to pay for the road improvements. The City would coordinate and monitor implementation of the mitigation measures. For both Alternative Road Networks, the following measures would be required to mitigate project impacts:

- o Alternative Road Network 1: Addition of project and pending project traffic would cause significant impacts at the intersections of Powell/Christie and Powell/I-80 northbound ramps. The LOS at the Powell/Christie intersection can be improved to LOS C ($V/C = 0.78$) by providing a "free" southbound right turn lane next to the Mobil Station. The City of Emeryville has already built this lane, but utility controls currently stand in the lane. Once the utility "boxes" are removed and other intersection modifications are made, this lane will be available. The LOS in this analysis at the Powell/I-80 northbound ramps intersection can be improved to LOS D ($V/C = 0.85$) by restriping the center lane of the offramp to a shared left-through-

right lane. By July 1989, Caltrans completed this restriping. For the coordinated signal operations at the interchange, this improvement would allow LOS D ($V/C = 0.90$) operations in the morning peak hour but would not improve the evening peak hour.

Evening peak hour operations could be improved by adding a westbound right turn lane at the northbound ramps intersection (adjacent to the Denny's restaurant), by adding a southbound left-turn lane at the Frontage Road/Powell intersection, and by resetting the signal timing parameters to improve efficiency. These combined improvements would achieve LOS E operations ($V/C = 0.98$). Further mitigation measures are discussed below.

- o Alternative Road Network 2: The proposed reconfiguration of the Powell/I-80 interchange would result in acceptable operations at the I-80 interchange. Roadway improvements for the Powell/Christie intersection would be the same as Road Alternative 1.

Two types of mitigation measures are listed above to mitigate the traffic impacts of the project. These two types, signal timing modifications and geometric modifications, are discussed below. Also, the effects of two additional measures, a Transportation Management Plan and other planned road construction projects in the study area, are discussed.

It should be emphasized that the traffic analysis portrays a worst-case condition by considering the completion and full occupancy of all pending projects and the proposed project. In addition, the analysis does not reflect the Bay Street and Shellmound Street extensions planned by the city, or the potential impacts of increased transit usage or carpooling by commuters.

Traffic Signal Timing Improvements. As indicated in the Impacts section, three intersections on Powell Street near I-80 operate as a coordinated system of traffic signals: the northbound ramps, southbound ramps and the west frontage road. A fourth, the signal at Christie Avenue and Powell Street, is synchronized with the system. Possible benefits may be derived from changing the signal timing parameters of the entire

system in addition to changing the signal at the intersection of Powell Street and Northbound I-80. The parameters control the length of green, yellow and red times, as well as the relationship between the different intersections.

Field observations indicate that the current timing parameters contain inefficient settings, leading to loss of capacity through the interchange. For the purpose of this analysis, it was assumed that the total signal system capacity could be increased by about 5% with retiming of the signals. Although the retiming would increase capacity and correspondingly improve LOS values, to attain an acceptable LOS in the evening peak hour, the retiming would have to be performed in conjunction with the intersection improvements discussed below.

Intersection Modifications. The traffic operations analysis revealed that the Powell Street/I-80 Ramp System would deteriorate to LOS F with the pending projects with or without the proposed project under Road Alternative 1. It would also be at LOS F after development of the proposed project for both project scenarios with either Alternative Road Network. These impacts could be mitigated by rechannelizing the northbound I-80 exit ramp as it approaches Powell Street. Currently, three lanes are provided on the ramp: a left turn lane, a left-through shared lane, and a single right turn lane.

Caltrans has already made an improvement at this location by restriping the center lane to a left-through-right shared lane, still retaining three lanes on the ramp. This restriping allows more capacity for the heavy volume of right turn traffic on the offramp. In the future with the project, the remaining capacity for the left turn and through traffic would be adequate for those moves. With the shared-lane design, p.m. peak hour traffic operations at the intersection would improve to LOS D (compared to the impact analysis), with $V/C = 0.85$.

The expected operation of the coordinated signal system would remain near capacity. A new westbound right-turn lane would be required at the northbound ramps intersection. This lane would allow more capacity for westbound through and right turn traffic, and would improve the V/C ratio to 1.04. An additional southbound left-turn lane on the Frontage Road would reduce the V/C ratio to 0.98, with a LOS of E. Resultant operations would be slightly better than existing.

Transportation System Management Program. A Transportation Management System (TSM) Plan would reduce the amount of passenger cars on the road system by providing viable alternatives to single-occupancy automobile travel. These alternatives include incentives to site occupants to carpool or vanpool, or use alternative transportation modes such as transit, bicycling or walking.

As a part of the proposed project, the project proponent also would implement various TSM programs to reduce commuter travel demand by project employees. The Conditions of Approval for the proposed project (June 7, 1988) require a Transportation System Management program with mandatory participation by building tenants. The 1988 Conditions of Approval also mandate a schedule of fines to be levied for non-compliance with the TSM performance goals. The project sponsor also will provide for rerouting of the existing private shuttle service to BART to go past the project site. The specifics of the TSM program would be developed in the future through negotiations between the City and the project sponsor.

With these actions, transit could be expected to serve up to 8% of project employees. Combined with increased carpooling, total project traffic could be reduced by 13% during the evening peak hour. A typical performance goal for the TSM program should be to reduce trips generated by the project to 8 to 13 percent below the levels in Table 4.3-5. This approach is easily administered by observing traffic volumes at the project driveways. Monitoring would be performed at biannual intervals after project occupancy reaches 70%.

A transportation management program, combined with intersection geometric improvements, the traffic signal timing improvements and the restriping, would reduce the significant impacts of the project to an acceptable level.

Street Extensions. Another potential measure for improving the LOS along Powell Street would be to construct the Bay Street extension southerly from 65th Street to Shellmound Street and the southern extension of Shellmound Street from the project site to Yerba Buena. These two street connections would result in changes to all of the three elements that make up total traffic in the area: existing volumes, traffic generated by pending projects, and traffic generated by the project. An additional run of the citywide traffic

model would be required to determine the full mitigation value of these two proposed street improvements.

The City of Emeryville is currently planning to construct a Bay Street extension (connecting the existing portion of Bay Street near 65th Street to Shellmound Street near Powell Street). Construction of the proposed extension is scheduled for early 1990, with completion expected by July 1990. Completion of the roadway will make the Bay Street ramps at the Ashby Avenue/I-80 interchange more accessible to drivers in the Bayfront District.

Preliminary studies of the proposed Shellmound Street extension are currently underway by the City Engineering staff. One alternative under consideration would extend Shellmound to the south as a two lane arterial. The roadway would turn to the east as an extension of Yerba Buena Avenue and would cross the Southern Pacific railroad tracks at-grade. A second alternative would follow the same general alignment but would cross the railroad tracks with a grade-separated structure (i.e., above or below the surface).

An optimistic estimate of a construction schedule for the extension shows the earliest likely completion of the at-grade alternative in late 1991, and of the grade separated alternative in mid-1992. If the roadway were opened to traffic, trips oriented to Oakland, I-580 or State Route 24 would be expected to divert from Powell Street to the new facility. An estimate of the diverted volume made for a previous study is about 600 vehicles per hour. This diversion would reduce the volume-to-capacity ratios at the Powell/I-80 northbound ramps intersection by about 10 percent. The reduction would be equivalent to an improvement in traffic operations by about one level of service (e.g., LOS E to LOS D).

Mitigation Measures for Construction Impacts

Impacts of truck traffic can be minimized by the following measures:

- o Schedule truck traffic outside of normal commute hours.
- o Trucks leaving the site should be prohibited from making left turns onto Powell Street. Drivers should use Shellmound Street to cross under Powell Street, and then access Powell Street with a right turn.

Conclusion

If the Pilot Plant is approved, current plans anticipate construction and full occupancy of the project before completion of the proposed Powell/I-80 interchange improvements or a Shellmound Street extension. Expected traffic flows for Road Alternative 1, with significant congestion during the evening peak hour, would therefore occur for a short period of time between completion of Shellmound Park and construction of the road improvement projects. Table 4.3-7 shows the levels of service expected during the p.m. peak and Table B-3 in Appendix B shows the estimates for the a.m. peak.

When construction of Road Alternative 2 is complete, evening peak hour traffic conditions would be acceptable, and no further improvements would be required at the Powell/I-80 interchange. As shown in Table 4.3-8, Levels of Service after the Caltrans modifications of the Powell/I-80 interchange would be LOS C at the Powell/I-80 and Powell/Christie intersections and LOS D for the Powell coordinated signal system. Table B-4 in Appendix B shows the estimates for the a.m. peak.

To mitigate traffic impacts during this interim period (prior to completion of the new I-80/Powell interchange), property owners in Emeryville, through an Assessment District, should financially support the following measures, in addition to the TSM strategies included in the Conditions of Approval for the project:

- o Monitor traffic conditions at the Powell/I-80 interchange and construct a westbound right-turn lane at Denny's, if volumes exceed capacity.
- o Monitor traffic conditions at the Powell/Frontage Road interchange and construct a southbound left-turn lane from Frontage Road onto Powell Street, if volumes exceed capacity. The modified intersection is shown in Figure B-7 in Appendix B.
- o Monitor conditions at the Powell/Christie intersection and provide a southbound free right-turn lane if volumes exceed capacity. This would require alterations beyond the right-turn lane currently being added by the City. Also, the utility companies would have to remove their equipment, as planned. The modified Powell/Christie intersection is shown in Figure 4.3-3.

In addition, Caltrans plans to widen the northbound I-80 off-ramp and to change lane marking and signal displays as discussed above under the heading Intersection Modifications.¹ Caltrans plans to implement this during the next twelve months in order to serve various pending projects.

TABLE 4.3-7
SUMMARY OF SIGNIFICANT IMPACTS AND MITIGATION ALTERNATIVES
VOLUME/CAPACITY RATIO AND LEVELS OF SERVICE FOR P.M. PEAK HOUR
UNDER ROAD ALTERNATIVE 1
(Existing Powell/I-80 Interchange)

	<u>Existing</u>	<u>Pending Projects Only</u>	<u>Pending Projects Plus Pilot Plant</u>	
			<u>Without Mitigation</u>	<u>With Mitigation</u>
Northbound I-80/Powell	0.74 (C)	0.94 (E)	1.00 (E)	0.84 (D) ¹
Coordinated Signal System	0.99 (E)	1.14 (F)	1.21 (F)	0.98 (E) ²
Powell/Christie	0.71 (C)	0.95 (E)	1.02 (F)	0.78 (C) ³

¹Restripe center lane to shared left-though-right turn lane.

²Restripe center lane to shared left-though-right turn lane, add a westbound right-turn lane at the northbound on-ramps and add a southbound left-turn lane on the Frontage Road. Provision of additional capacity is not feasible due to physical constraints at the interchange.

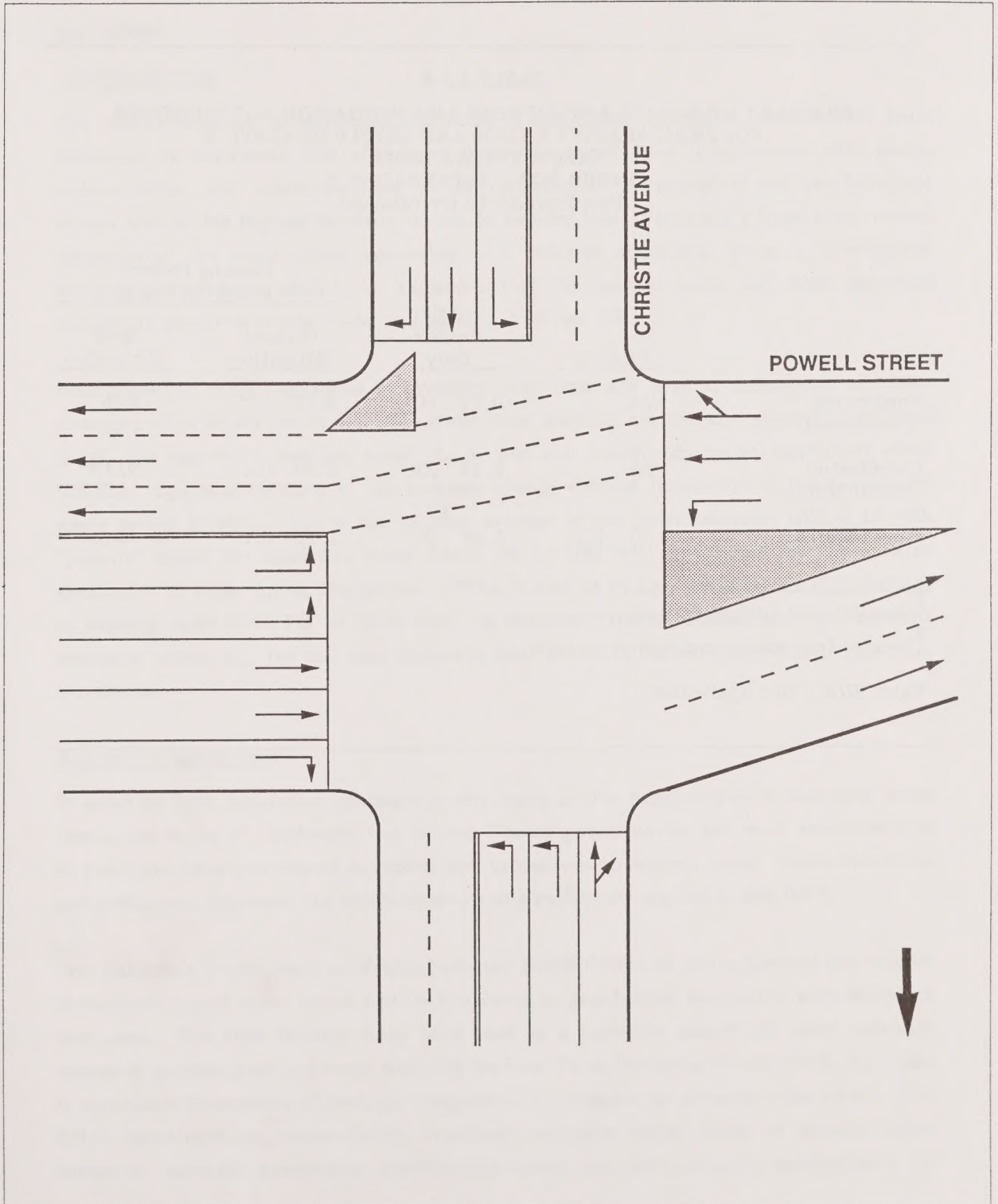
³Provide free southbound right-turn lane.

Regarding construction of the above road improvements, every available means could be used to maintain the same number of lanes that are currently available during peak hours. Work requiring lane closures would be scheduled during weekends and/or at night.

¹Eric Harris, AC Transit Planning, personal communication, February 22, 1989.

PROPOSED ROAD CHANGE
POWELL / CHRISTIE INTERSECTION

FIGURE 4.3-3



SOURCE: CH2M HILL

NOT TO SCALE



TABLE 4.3-8
 SUMMARY OF SIGNIFICANT IMPACTS AND MITIGATION ALTERNATIVES
 VOLUME/CAPACITY RATIOS AND LEVELS OF SERVICE
 FOR P.M. PEAK HOUR
 UNDER ROAD ALTERNATIVE 2
 (New Powell/I-80 Interchange)

	<u>Existing</u>	<u>Pending Project Only</u>	<u>Pending Project Plus Pilot Plant</u>	
			<u>Without Mitigation</u>	<u>With Mitigation</u>
Northbound I-80/Powell	N/A	0.71 (C)	0.77 (C)	N/A ¹
Coordinated Signal System	N/A	0.84 (D)	0.90 (D)	N/A ¹
Powell/Christie	0.71 (C)	0.96 (E)	1.02 (F)	0.78 (C) ²

¹No additional mitigation measures.

²Provide free southbound right-turn lane.

Note: N/A = Not Applicable.

4.4 NOISE

INTRODUCTION

The human response to environmental noise is subjective and varies considerably from individual to individual. The effects of noise can range from interference with sleep, concentration, and communication, to the causation of physiological and psychological stress, and, at the highest intensity levels, to hearing loss. Table 4.4-1 illustrates several examples of the noise levels associated with common situations, given in A-weighted decibels (abbreviated dBA). An explanation of the decibel scale and other essential aspects of acoustics can be found in Appendix G of this EIR.

Environmental noise fluctuates in intensity over time and several descriptors of time-averaged noise levels are in use. The three most common are the equivalent energy level (L_{eq}), the day-night average level (L_{dn}), and the community noise equivalent level (CNEL). L_{eq} is a measure of the average energy content (intensity) of noise over any given period of time. L_{dn} is the 24-hour average of the noise intensity with a 10 dBA "penalty" added for nighttime noise (10:00 PM to 7:00 AM) to account for the greater sensitivity to noise during this period. CNEL is similar to L_{dn} , but adds a 5 dBA penalty to evening noise (7:00 PM to 10:00 PM). In situations where vehicles are the dominant source of noise, L_{eq} for the peak commute hour is usually about 2 dBA higher than L_{dn} and CNEL.

Regulatory Background

In order to limit population exposure to physically and/or psychologically damaging noise levels, the State of California, the various County governments, and most municipalities in the State have established standards and ordinances to control noise. These standards and ordinances represent the standard levels of significance applied in this DEIR.

The California Department of Health Services' (DHS) Office of Noise Control has studied the correlation of noise levels and their effects on populations associated with different land uses. The DHS findings have been used as a basis for almost all noise exposure standards promulgated in County and City General Plans, including Emeryville's. Appendix G contains a description of land use compatibility compared to ambient noise levels. The City's noise/land use compatibility standards recognize three levels of outdoor noise exposure: normally acceptable, conditionally acceptable, and normally unacceptable. At

TABLE 4.4-1
DESCRIPTION OF NOISE LEVELS

Jet takeoff at 200 feet	125 dBA
Discotheque	115 dBA
Motorcycle at 20 feet	110 dBA
Freight train at 50 feet	95 dBA
Freeway traffic at 50 feet	80 dBA
Vacuum Cleaner	70 dBA
Average Office	50 dBA
Library	40 dBA
Recording Studio	20 dBA
Leaves rustling	10 dBA

the normally acceptable level, noise (as measured in L_{dn}) would be compatible with a given land use without any special abatement requirements. For high-density residential uses, an L_{dn} of up to 60 dBA would be considered normally acceptable, while an L_{dn} of up to 65 dBA could be tolerated for office uses. Conditionally-acceptable noise levels span a relatively large range within which a land use would remain compatible with City standards if the necessary noise abatement measures were taken to protect that population. For high-density residential uses, an L_{dn} between 60 dBA and 75 dBA would be considered conditionally acceptable, while an L_{dn} between 65 dBA and 80 dBA could be tolerated for office uses. Noise levels would only become normally unacceptable (that is, development of that land use would be discouraged by the City unless extraordinary steps were taken to protect that population from severe noise exposure) for a given land use when they surpass the upper bound of conditional acceptability.

The only State-wide interior noise standard is promulgated in Title 24 of the California Administrative Code, but it only applies to new multi-family residential units. This standard requires that such buildings to be located in areas where the existing L_{dn} exceeds 60 dBA must have an acoustical study performed before construction to establish

mitigation that will limit the maximum L_{dn} to 45 dBA in any inhabitable room. Emeryville has adopted this standard for all residential uses and has set its interior standard for office uses at an L_{dn} of 55 dBA.

SETTING

City and Project Site. The two major sources of noise in the City of Emeryville are motor vehicles and trains. Interstate 880 and Interstate 580 are the most intense sources of traffic noise, but vehicles using local streets, especially major arterials such as Powell Street, also contribute significantly to the total. A main branch of the Southern Pacific Railroad (SPRR) also passes through Emeryville. The remainder of the ambient noise is produced by aircraft overflights, industrial processes, construction operations, and the human and animal population of the City. A noise monitoring program was conducted by the City in 1985 as part of its General Plan revision. Measurements taken at 16 different locations throughout Emeryville span a relatively wide range; noise levels in the residential parts of central Emeryville were as low as 55-60 dBA while much of the Bayfront experienced noise of 70-75 dBA.¹

The project site is located relatively far from I-580, but I-80 passes immediately to the west of the site. Because of the proximity to I-80, the site's noise environment is dominated by the freeway. Even though the SPRR tracks pass a block to the east, railway noise proved not to be a major influence because the line-of-sight from the tracks to the site is blocked by intervening structures. Land uses in the project vicinity are mostly commercial/industrial. The nearest residential use with a direct line-of-sight to the proposed Pilot Plant is the Pacific Park Plaza development, about 1,500-2,500 feet to the north.

Although noise levels throughout the City were extensively mapped in 1985, more recent data is not available from the City and, as far as it was possible to determine, no monitoring has ever been done on the project site. To supplement the existing data, additional measurements were undertaken as part of this EIR. During the afternoon of January 24, 1989, two measurements of ambient noise were made during the afternoon commute peak. The first yielded an L_{eq} of 72 dBA, and was taken near the southwest corner of the project site, about 30 feet from the fence at the boundary of the I-80 right-of-way. The second yielded an L_{eq} of 73 dBA, and was taken about 40 feet from the I-80

right-of-way but north of Powell Street on the sidewalk along Lacoste Street. The measurement was made at the second location to allow comparison to 1985 data contained in the General Plan. At both locations, motor vehicle traffic on I-80 was the predominant source of noise. Commute peak traffic congestion along I-80 was very apparent and the measurements indicated that traffic congestion has a significant decremental effect on noise levels. Usually, peak hour L_{eq} 's are about 2 dBA higher than the L_{dn} . In this case, however, the L_{eq} 's were significantly lower than the L_{dn} measured in 1985 (80 dBA at 80 feet from the freeway right-of-way fence) due to the peak traffic congestion that forced the cars to slow down and reduced the noise level generated along I-80. Additional day and night off-peak noise measurements were conducted to determine the existing (1989) L_{dn} . Calculations based on this data indicate an L_{dn} of about 80 dBA along the west boundary of the project site. This confirmed that the motor vehicle L_{dn} noise contours presented in Figure V-5 of the General Plan accurately represent the noise environment of the project site.

IMPACTS

Construction Noise

The two project scenarios would have similar levels of noise impacts during construction, so the discussion below applies to both scenarios.

Construction activities would temporarily generate high noise levels on and around the site over the entire period of project construction. Table 4.4-2 shows outdoor noise levels likely to be experienced during the various construction phases. Noise from localized sources typically falls off by about 6 dBA with each doubling of distance from source to receptor. Therefore, when noise on the construction site exceeds 90 dBA, outdoor receptors having an uninterrupted view of the construction site and located within 1,600 feet of it would experience noise greater than 60 dBA.

Considering the pervasive influence of freeway noise in the site environs, the lack of sensitive receptors (e.g., residential units) nearby, and the presence of structures surrounding the site which would block sound propagation into the more distant residential neighborhoods, there is little likelihood of significant adverse effects due to construction noise.

TABLE 4.4-2
TYPICAL CONSTRUCTION NOISE LEVELS AT 50 FEET (dBA)¹

Construction Phase	Commercial/Industrial Construction Average Noise Level	Housing Construction Average Noise Level
Groundclearing	84	84
Excavation	89	88
Foundations	78	81
Erection	85	82
Finishing	89	88

¹Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances, prepared by Bolt, Beranek, and Newman for the U.S. Environmental Protection Agency, December 31, 1971, p. 20

Operational Noise

Traffic generated by the proposed Pilot Plant would have its greatest noise impacts in the area immediately surrounding the project site, but since that area is already exposed to high noise generated by I-80 and the SPRR rail line, the incremental noise increase from the project to the existing background would be insignificant in comparison.

Exposure of Pilot Plant Employees to Ambient Noise

Noise from I-80 could adversely impact the workers in the proposed Pilot Plant unless structural design provides substantial noise attenuation. As already mentioned, the L_{dn} at the west boundary of the site is 80 dBA and, judging from Figure V-4 of the General Plan (Future Noise Contours), the entire site is likely to be over 70 dBA. The building could be exposed to even higher noise levels in the future if I-80 is widened, since a capacity increase and the consequent traffic flow improvements would intensify noise near the freeway.

The Emeryville General Plan requires that the maximum L_{dn} in office buildings (and applicable to the Pilot Plant) not exceed 55 dBA. To achieve this and to provide an additional margin of comfort should freeway noise increase, the proposed Pilot Plant would be designed to attenuate outdoor noise by at least 30 dBA. The potentially significant impact of exposing employees to excessive noise levels would, therefore, be mitigated to insignificance.

MITIGATION MEASURES

These noise reductions can be readily achieved by incorporating design features which reduce the intensity of freeway noise transmitted to the building occupants. There are many ways such attenuation can be achieved, e.g., using acoustically absorptive material for the building's outer walls, using sealed, double-glazed windows together with mechanical ventilation, decreasing the size of the windows in relation to the wall area, etc. As a condition of project approval, the project architect should provide evidence that the proposed buildings will be adequately insulated to meet the specified standard.

¹Emeryville General Plan, Chapter V: Public Health and Safety, June, 1987, p. V-22.

4.5 AIR QUALITY

SETTING

Regulatory Background

Criteria Pollutants. The 1970 Clean Air Act gave the U.S. Environmental Protection Agency (EPA) the authority to set federal ambient air quality standards. The Act indicated the need for primary standards to protect public health and secondary standards to protect public welfare from effects such as visibility reduction, soiling, nuisance, etc. It also required that the federal standards be designed to protect those people most susceptible to respiratory distress, such as asthmatics, the elderly, very young children, people already weakened by illness, and persons engaged in strenuous work or exercise (all termed "sensitive receptors"). Pollutants subject to federal ambient standards are referred to as criteria pollutants because the EPA publishes criteria documents to justify the choice of standards.

In 1971, the EPA established federal standards for five major air pollutants: photochemical oxidants (ozone), carbon monoxide (CO), nitrogen dioxide (NO₂), sulfur dioxide (SO₂) and suspended particulate matter (originally the standard applied to particulate of any diameter, termed total suspended particulate or TSP, but the standard was recently changed to apply only to particulates less than 10 microns in diameter, termed PM₁₀).

State ambient air quality standards were established in California starting in 1969, pursuant to the Mulford-Carrell Act. The federal and State standards, given in Table 4.5-1, provide acceptable durations for specific contaminant levels in order to protect sensitive receptors from adverse effects as indicated in Table 4.5-2.

The 1977 Clean Air Act Amendments (passed after many states failed to meet the five-year deadline for achieving the federal standards) required that each state identify areas within its borders that did not meet federal primary standards (i.e., non-attainment areas) and devise a State Implementation Plan (SIP), subject to EPA approval, to attain federal primary standards no later than the end of 1987. The Clean Air Act Amendments did not specify what course of action should be undertaken by the EPA if states fail to meet the 1987 attainment deadline. Many options are open to the EPA, ranging from the

TABLE 4.5-1
FEDERAL AND STATE AMBIENT AIR QUALITY STANDARDS

<u>Pollutant</u>	<u>Averaging Time</u>	<u>Federal Primary Standard</u>	<u>Federal Secondary Standard</u>	<u>California Standard</u>
Ozone	1-hour	0.12 ppm	0.12 ppm	0.10 ppm
Carbon Monoxide	1-hour	35.0 ppm	35.0 ppm	20.0 ppm
	8-hour	9.0 ppm	9.0 ppm	9.0 ppm
Nitrogen Dioxide	1-hour	---	---	0.25 ppm
	Annual	0.05 ppm	0.05 ppm	---
Sulfur Dioxide	1-hour	---	---	0.5 ppm
	24-hour	0.14 ppm	---	0.05 ppm
	Annual	0.03 ppm	---	---
PM ₁₀	24-hour	150 ug/m ³	---	50 ug/m ³
	Annual	50 ug/m ³	---	30 ug/m ³

ppm = parts per million, ug/m³ = micrograms per cubic meter.

Source: Bay Area Air Quality Management District.

TABLE 4.5-2
HEALTH EFFECTS SUMMARY OF THE CRITERIA AIR POLLUTANTS

Air Pollutant	Adverse Effects
Ozone	- o eye irritation - o respiratory function impairment
Carbon Monoxide	- o impairment of oxygen transport in the bloodstream, increase of carboxyhemoglobin - o aggravation of cardiovascular disease - o impairment of central nervous system function - o fatigue, headache, confusion, dizziness - o can be fatal in the case of very high concentrations in enclosed places
Sulfur Dioxide	- o aggravation of chronic obstruction lung disease - o increased risk of acute and chronic respiratory illness
Nitrogen Dioxide	o risk of acute and chronic respiratory illness
Particulate Matter	- o increased risk of chronic respiratory illness with long exposure - o altered lung function in children - o with SO₂, may produce acute illness - o particulate matter 10 microns or less in size (PM₁₀) may lodge in and/or irritate the lungs

Source: Bay Area Air Quality Management District.

immediate imposition of sanctions on the non-attainment areas (e.g., prohibiting the construction of major air pollution sources and withholding federal funds for transportation and sewage treatment projects) to ignoring the standard violations and waiting for Congress to amend the Clean Air Act.

Now that 1987 has passed and many states, including California, still violate federal standards, the EPA has adopted an interim policy with the following components: 1) non-attainment areas will be given until the end of 1990 to revise their SIP's to demonstrate attainment and maintenance, 2) after submittal of the revised SIP's, the EPA will classify non-attainment areas as near-term (i.e., attainment predicted in 3-5 years) or long-term (i.e., attainment more than 5 years away), 3) sanctions against the construction of major air pollutant sources in long-term non-attainment areas will take effect 3-5 years from Plan submittal (i.e., 1995-1996), 4) in near-term non-attainment areas, pollutant emission reductions of 3% per year will have to occur until standards are attained and standard maintenance for a period of ten years thereafter will have to be demonstrated. The EPA's policy would become moot if Congress amends the Clean Air Act to specify a different course of action, but as of the end of 1988 Congress has not been able to reach agreement on such a revision.

Until recently, there was no specific deadline for the attainment of California standards. However, among the many bills enacted during the closing days of the 1987-88 biennial session of the California Legislature was AB 2595 (Sher), the so-called California Clean Air Act. AB 2595 was signed into law by Governor Deukmejian, and it became effective on January 2, 1989. This legislation requires areas of the State which exceed California air quality standards to plan for the eventual attainment of State standards. The time given to the various areas to attain State standards will depend on the severity of air quality problems there. Areas classified as "moderate" will have until 1994 to attain State standards, while "serious" and "severe" areas will have until 1997 and beyond, respectively.

The Bay Area Air Quality Management District has a regulation for organic compounds from pharmaceutical and cosmetic manufacturing operations (Regulation 8, Rule 27). Among other provisions, the regulation limits emissions of organics from "reactors" (in Chiron's case, fermenters) to 15 lbs. per day from any single piece of equipment.

Toxic Air Contaminants. Besides criteria pollutants, regulatory attention has recently turned to toxic air contaminants, such as metals, solvents, and asbestos. The Bay Area Air Quality Management District (BAAQMD) issued an Air Toxics Risk Screening Policy and a Risk Management Policy in February 1988, which address toxic air contaminants. The BAAQMD is authorized to require permits for sources that generate toxic air emissions.

These policies are codified in BAAQMD Regulations 2, Rule 1, which states that new sources of toxic air contaminants are not exempt from obtaining an Authority to Construct and Permit to Operate if they emit air toxics in a quantity determined to be appropriate for review by the Air Pollution Control Officer.¹ BAAQMD requires that a Risk Screening Analysis be prepared for any project with a potential to impact public health, and BAAQMD staff review an Analysis to determine whether a proposed project will have a significant or an insignificant public health effect.²

The BAAQMD Air Toxics Risk Screening Policy (1988) lists contaminants and contaminant sources which trigger a Screening Analysis. Projects which qualify for review under these criteria and are deemed insignificant require no further toxics review; projects deemed significant must provide a Formal Risk Assessment unless the project sponsor: 1) modifies the project to reduce the health risks to levels that are below the significance criteria; or 2) prepares a Refined Screening Analysis showing that risks are below the significant criteria.³

Air Pollutant Problems and Trends

Bay Area Air Basin. Regionally, the most severe and complex air quality problem is the relatively high level of ambient ozone experienced during warm, meteorologically stable periods in the summer and autumn. Ozone is not emitted directly from pollutant sources, but is formed in the atmosphere through a complex series of photochemical reactions involving reactive organic compounds (ROG) and nitrogen oxides (NO_x). No single source category accounts for a majority of the ROG and NO_x emissions, and the many sources are spread throughout the Bay Area air basin. Although the Bay Area's highest ozone levels can fluctuate from year to year, standards are exceeded most often in the Santa Clara, Livermore, and Diablo valleys. The problem is most severe in Santa Clara County, where ozone levels occasionally have approached the first-stage Health Advisory Level (0.2 parts per million).

In contrast to ozone, CO is a sub-regional problem in the Bay Area, because CO is a non-reactive pollutant with one major source, motor vehicles. Ambient CO distributions closely follow the spatial and temporal distributions of vehicular traffic, and are strongly influenced by meteorological factors such as wind speed and atmospheric stability. The one-hour and eight-hour CO standards are occasionally exceeded in those parts of the Bay area subject to a combination of high traffic density and susceptibility to the occurrence of surface-based radiation inversions during the winter months (i.e., northern Santa Clara, western Alameda, and southwestern Solano Counties).

Particulate levels in the Bay Area typically show a pattern of low values near the coast. They increase with distance inland and reach their highest levels in dry, sheltered valleys, such as the Santa Clara, Diablo, and Livermore Valleys. The most important anthropogenic sources in the Bay Area are demolition and construction activity, and motor vehicle travel over paved and unpaved roads. The old federal secondary TSP standard is occasionally exceeded in many Bay Area communities.

The major sources of NO_x , compounds which have an important role in the formation of ozone, are vehicular, residential, and commercial fuel combustion. Concentrations of NO_2 , the most abundant form of ambient NO_x , are highest in the South Bay, where the standard was last exceeded in 1980 at the San Jose monitoring station. The NO_2 standard has not been exceeded anywhere in the Bay Area since that time. The burning of high sulfur fuels for activities such as electricity generation, petroleum refining, and shipping are the major sources of ambient SO_2 . The highest levels of SO_2 are recorded by monitoring stations located in a relatively narrow crescent centered on the bayshore of northern Contra Costa County, where the major sources are located. Bay Area seasonal maximums, however, rarely exceed 50% of the standard and SO_2 levels at most Bay Area monitoring stations are less than 10% of the standard. The SO_2 standard is currently being met throughout the Bay Area.

The BAAQMD operates a regional air quality monitoring network in order to gauge the Bay Area's progress toward attainment of federal and State ambient air quality standards. At these monitoring stations readings are taken regularly of the five major criteria air pollutants. On the basis of monitoring data from all stations in the Bay Area, the entire Bay Area has been designated a non-attainment area with respect to the federal ozone

and CO standards, and Santa Clara County as a non-attainment area with respect to the old federal secondary TSP standard. The Bay Area's current status with respect to the new federal PM₁₀ standard is undetermined. The BAAQMD is hopeful that PM₁₀ monitoring data will justify designation of the Bay Area as attainment for PM₁₀.

The East Bay and Emeryville. A three-year summary of the data collected in the East Bay at the Richmond, Oakland, and Concord stations, together with the most applicable air quality standards, are shown in Table 4.5-3. The data in Table 4.5-3 show occasional violations of federal and State standards for ozone and clearly illustrate the worsening of ozone and particulate problems as one moves inland from the Bay shore. Ambient levels of CO, NO₂, and SO₂ at these stations are more strongly influenced by the proximity of large sources and do not show a strong geographical correlation. While there is no BAAQMD monitoring station in Emeryville, other BAAQMD data suggest that an average worst-case CO background of 8 ppm and 6 ppm for one-hour and eight-hour averaging periods, respectively, is likely in the City.⁴ This background is relatively high in comparison to levels measured in many other Bay Area communities because of the proximity of I-80, a major source of CO.

Air Quality Planning and Control in the Bay Area

Planning for the attainment and maintenance of federal and State air quality standards in the Bay Area is the joint responsibility of the BAAQMD, the Association of Bay Area Governments (ABAG), and the Metropolitan Transportation Commission (MTC). To deal with violations of federal CO and ozone standards in the region, the BAAQMD, ABAG, and the MTC authored the 1982 Bay Area Air Quality Plan (AQP). The AQP called for the imposition of additional controls on stationary and mobile sources of ROG and CO, and set forth a schedule for adopting and implementing these controls. The most important of the CO and ozone strategies proposed in the AQP was the motor vehicle inspection/maintenance (I&M) program, adopted by the State of California in 1984. However, many controls on stationary sources of air pollutants were also adopted. The AQP projected attainment of federal standards for CO and ozone by 1987 and their maintenance below the standards through the year 2000. The AQP proposed no additional measures for particulate control. This problem is difficult to control with currently available methods, and the AQP only recommended further research on the problem.

TABLE 4.5-3
AIR POLLUTANT DATA SUMMARY 1985-1987

STATIONS: Richmond (RCMD), Oakland (OKLD), Concord (CNCD)

Pollutant	1985			1986			1987		
	RCMD	OKLD	CNCD	RCMD	OKLD	CNCD	RCMD	OKLD	CNCD
OZONE:									
Highest 1-hour	0.09	0.12	0.15	0.07	0.09	0.12	0.09	0.09	0.14
Days > 0.12 ppm	0	0	1	0	0	0	0	0	3
CARBON MONOXIDE:									
Highest 1-hour	8.0	9.0	11.0	8.0	12.0	10.0	8.0	9.0	12.0
Days > 20.0 ppm	0	0	0	0	0	0	0	0	0
Highest 8-hour	4.3	5.8	5.3	5.0	7.5	5.6	4.8	4.9	5.5
Days > 9.0 ppm	0	0	0	0	0	0	0	0	0
NITROGEN DIOXIDE:									
Highest 1-hour	0.11	NM	0.10	0.13	NM	0.11	0.09	NM	0.13
Days > 0.25 ppm	0	NM	0	0	NM	0	0	NM	0
SULFUR DIOXIDE:									
Highest 24-hour	0.011	NM	0.017	0.008	NM	0.008	0.018	NM	0.008
Days > 0.05 ppm		NM	0	0	NM	0	0	NM	0
PARTICULATES:									
Highest 24-hour TSP	125	NM	131	85	NM	96	99	NM	135
Days > 150 ug/m ³	0	NM	0	0	NM	0	0	NM	0
Annual average TSP	53	NM	43	38	NM	39	43	NM	48
Year > 60 ug/m ³	No	NM	No	No	NM	No	No	NM	No
Highest 24-hour PM ₁₀	NM	NM	NM	NM	NM	86	NM	NM	85
Days > 50 ug/m ³	NM	NM	NM	NM	NM	4	NM	NM	6
Annual average PM ₁₀	NM	NM	NM	NM	NM	27	NM	NM	29
Year > 30 ug/m ³	NM	NM	NM	NM	NM	No	NM	NM	No

Units - ppm: parts per million; ug/m³: micrograms per cubic meter
NM: not monitored

Source: California Air Resources Board, Air Quality Data Summary, 1985-1987.

Monitoring data for 1987 shows that occasional violations of the federal ozone and eight-hour CO standards (i.e., 14 days over the standard for ozone, and 1 day over the standard for CO) are still being measured in the Bay Area. As a result of these measurements, the BAAQMD will not be able to declare regional attainment of the ozone standard, but the Bay Area could make a case for CO attainment because one violation per year is allowable under federal guidelines. However, the BAAQMD would probably not be able to convince the EPA that this air quality problem has been overcome. Weather conditions last winter were not favorable to the formation of inversions which limit the dispersion of CO. The occurrence of more severe inversion conditions in succeeding winters could cause additional violations of the eight-hour CO standard.

IMPACTS

Project air quality impacts comprise two categories: temporary impacts due to construction and long-term permanent impacts due to operation. Impacts in each category can be classed as having effects on regional or local scales.

Construction Impacts

Regional Effects. The quantities of particulate, construction equipment exhaust, and excess pollutants emitted by motor vehicles stopped or slowed by the congestion of local streets by construction activity would be too small relative to present and future Bay Area totals to significantly affect ambient pollutant levels outside Emeryville.

Local Effects. Clearing, excavation and grading operations, construction vehicle traffic on unpaved ground, and wind blowing over exposed earth surfaces generate dust. Therefore, construction in the redevelopment area would temporarily increase TSP and PM₁₀ concentrations and could lead to violations of the federal and State 24-hour average PM₁₀ standards if dust suppression measures were not implemented.

It is not possible to estimate accurately the PM₁₀ concentrations that would occur at or adjacent to the construction sites because such concentrations are very sensitive to local meteorology and topography, to variations in soil silt and moisture content, and to the level of equipment use. However, EPA measurements made during apartment and shopping center construction in the southwestern United States provide a rough indication

of the maximum rate of particulate emissions. These measurements indicate that approximately 1.2 tons of dust are emitted per acre per month of construction activity.⁵ About 45% of this dust is comprised of large particles which would settle out rapidly on nearby horizontal surfaces. Large diameter particulate matter generated by construction are, therefore, of concern more as a soiling nuisance rather than for its unhealthful impacts. However, the remaining fraction of PM₁₀ may aggravate the respiratory problems of people living and working nearby. Because of the distance of the project site from the nearest residential neighborhoods, the potential for adverse PM₁₀ impacts during construction is low.

Construction vehicles/equipment would emit exhaust at the construction sites. Large numbers of such vehicle/equipment operating or idling in a small area may cause spot violations of the CO standards. Odors of construction equipment exhaust would probably be noticeable in the environs of the project site for the duration of construction. Because of the distance of the project site from the nearest residential neighborhoods, the potential for adverse CO and odor impacts during construction is low.

Cumulative Construction Impacts

As discussed in the transportation section, a number of other developments are proposed for Emeryville in the near future. The locations of these projects are shown in Figure 4.2-2. If excavation at the Pilot Plant coincides with excavation at one or more of these other projects, then there could be cumulative air quality impacts from particulate emissions. Since the excavation and construction schedules for the proposed project and the other projects are not available, it is not possible to estimate the cumulative particulate matter emissions. However, these emissions would likely be in the range of 1.2 tons of dust per acre per month, as discussed above. These emissions would be localized and short-term. A worst-case scenario would include a combination of particulate matter from the proposed project site plus dust from construction at Shellmound Park plus a contribution from another one or two projects under construction. With implementation of mitigation measures presented below, this cumulative impact is not expected to be significant.

Operational Impacts Due to Increased Traffic

Regional Effects. Motor vehicles would be the major source of additional air pollutants resulting from the project. Air pollutant emissions from the net new vehicle trips generated by the project are indicated in Table 4.5-4. The BAAQMD has established emission levels above which air pollutant impacts for any project are considered significant. For air pollutants generated by vehicular sources, project emissions greater than 1% of the total County motor vehicles emissions are considered significant on the regional scale. Net vehicular emissions from the Pilot Plant would not exceed the BAAQMD significance thresholds.

Local Effects. To check the likelihood of a worsening of local CO levels, future CO concentrations near three local intersections were calculated by applying a simplified version of the CALINE4 model developed by the BAAQMD. This analysis includes both the Pilot Plant and the proposed Shellmound Park development. Table 4.5-5 summarizes the calculated CO concentrations at the three intersections. The eight-hour CO standard (9.0 ppm) is already exceeded and will continue to be exceeded at curbside at all of the three intersections. Modeling also suggests that, while the violations would be limited to the sidewalk areas over most of the length of these major local roadways, the eight-hour CO concentrations would remain above the standard within a 100-200 foot radius of the intersections.

In almost all cases, future CO levels at all intersections should decline regardless of whether or not the Pilot Plant and related Shellmound Park project are built; this improvement would be brought about by the increasing effectiveness of State-mandated vehicular emission controls. The potential for continued eight-hour standard violations at the three intersections would persist regardless of whether or not the project is built. However, the impact of the project would contribute to the cumulative exceedance of the standard and would be significant.

Operational Impacts Due To Pilot Plant Manufacturing

Criteria Pollutants. Manufacturing activities at the Pilot Plant would generate several types of emissions: ethanol from fermentation, NO_x from natural-gas fired boilers, sodium hydroxide and phosphoric acid, solvents, radionuclides and others. These are

TABLE 4.5-4
ESTIMATED EMISSIONS FROM PROJECT GENERATED TRAFFIC (TONS/DAY)¹

<u>Pollutant</u>	<u>Pilot Plant</u>	<u>Countywide Vehicular Emissions²</u>	<u>Bay Area Air Basin Total³</u>
Carbon Monoxide	.018	534.3	1403
Reactive Organics	.001	70.3	193
Nitrogen Oxides	.002	67.5	182

¹Project emissions were calculated by using the California Air Resources Board URBEMIS2 model. An average vehicle speed of 35 mph, and ambient temperatures of 75°F for CO, ROG and NO_x were assumed.

²Countywide vehicular emissions were taken from Base Year 1983 Emissions Inventory Summary Report, BAAQMD, August 1987.

³The regional totals given here are BAAQMD estimates for motor vehicle emissions in the year 2000. Estimates were taken from Air Quality and Urban Development, Table VI-A-2.

TABLE 4.5-5

ESTIMATED WORST-CASE CURBSIDE CARBON MONOXIDE CONCENTRATIONS AT
SELECTED INTERSECTIONS IN THE PROJECT VICINITY (IN PPM)^{1,2}

Intersection	Averaging Time	Existing 1989	Existing + Cumulative 2000	Existing + Cumulative + Pilot Plant & Shellmound Park	
				Unmitigated 2000	Mitigated 2000
I-80 Northbound Ramps/ Powell	1 hr.	19.0	17.2	19.5	15.2
	8 hr.	13.7	12.4	14.0	11.1
Powell/ Christie	1 hr.	18.2	16.4	17.0	17.0
	8 hr.	13.1	11.9	12.3	12.3
MacArthur/ San Pablo	1 hr.	20.4	17.1	17.3	17.3
	8 hr.	14.7	12.4	12.4	12.4
Background	1 hr.	8.0	7.3	7.3	7.3
	8 hr.	6.0	5.5	5.5	5.5
Standards	1 hr.	20.0	20.0	20.0	20.0
	8 hr.	9.0	9.0	9.0	9.0

¹The tabulated concentrations are the sums of a background component, which includes the cumulative effects of all CO sources in the project vicinity, and a local component, which reflects the effects of vehicular traffic on roadways. Background components were obtained from Air Quality and Urban Development, BAAQMD, November 1985. Traffic data was provided by CH2M Hill.

²This analysis includes both the Pilot Plant and the proposed Shellmound Park developments (two office buildings or an office/hotel complex).

PPM = Parts per million.

discussed below. In addition, the plant would have a diesel-fired emergency generator, which would be seldom used or not regarded by the BAAQMD as a significant source of emissions. Regulations restrict the sulfur content of oil for this generator.

Ethanol. Pilot Plant manufacturing would primarily involve yeast fermentation which produces waste carbon dioxide (CO₂); waste gaseous ethanol, and smaller quantities of other process-dependent substances. Various manufacturers, such as yeast makers, bakeries and breweries, use yeast fermentation and produce the same types of air emissions. By comparison, these industries' activities emit vastly greater quantities of CO₂ and ethanol than small-scale biotechnology manufacturing.⁶ Ethanol is an organic compound which acts as a precursor to ozone and is therefore regulated by the BAAQMD.⁷ Recently, the District has considered limiting ethanol emissions from large bakeries, although implementation of new regulations is not expected to occur until later this year.⁸

During biotechnology product manufacturing, ethanol often exists in the fermentation "broth" at approximately one to two percent concentrations, although Chiron plans to maximize the ethanol metabolized, thereby producing less waste ethanol. The concentration also varies depending on factors such as the strain of yeast and the substances "fed" to the yeast.⁹ Ethanol vapor from the broth may collect in the fermenter's head, and ethanol concentration in this gaseous fraction is estimated at 1/1,000 of one percent of the liquid concentration.¹⁰

Waste gas is removed from the fermentation vessel by forcing air through the system. Typically, the volume of air introduced is equal to the volume of the fermenter per minute. A 10,000-liter fermenter produces waste ethanol emissions at a rate of about twenty liters per hour during a given fermentation "run".¹¹ The Pilot Plant would house one 10,000-liter, two 1,000-liter, five 200-liter and thirty 10-liter fermenters. Chiron estimates that the maximum ethanol emissions from all fermenters in the proposed project would be 2.77 pounds per hour (lb/hr) or 1.60 liters/hour (l/hr). This is equivalent to 13.9 lb/day or 8.0 l/day.

For any single piece of equipment, primarily the fermenters, ethanol emissions would be 2.1 lb/hr (1.2 l/hr) or 10.4 lb/day (5.99 l/day). The fermenters would be equipped with

condenser coils, which Chiron estimates would reduce emissions by 90% (resulting in the above estimates). Chiron estimates that the monthly average ethanol emissions for all fermenters would be 140 pounds or 80 liters. This equals an annual average of less than one ton which is not a significant measure when compared to other local industrial fermentation activity (e.g., alcoholic beverage production or yeast manufacture).

NO_x. The proposed project would contain two natural-gas fired boilers to create steam for sterilization of equipment. Airborne NO_x emissions would be produced. The boilers are rated at 300 horsepower, which is equivalent to about 10 to 15 million British thermal units (BTU) per hour. Since this is below the regulatory threshold of 1.75 billion BTU¹², the boilers would not require BAAQMD permits. The NO_x emissions would not be a significant impact.

Toxic Air Contaminants

Sodium Hydroxide and Phosphoric Acid. Pilot Plant equipment cleaning systems would employ dilute aqueous solutions of sodium hydroxide and phosphoric acid, which are included in BAAQMD's list of toxic air contaminants to be addressed by a risk screening analysis. Cleaning agents would be stored, transferred and used in closed systems, and gaseous emissions of sodium hydroxide and phosphoric acid are not expected. Fugitive emissions of these substances could emanate from openings in storage vessels (e.g., around covers), but quantities would be minute. Neither sodium hydroxide nor phosphoric acid are extremely volatile.

Solvents. Biotechnology manufacturing involves the use of several types of solvents in the product purification process. High Pressure Liquid Chromatography (HPLC) solvents and other solvents used by Chiron include acetonitrile, acetic acid, methanol, ethanol, and trifluoroacetic acid (TFA). As with cleaning agents, solvents are generally stored, transferred and used in closed systems; waste products are similarly treated, stored and disposed with little atmospheric exposure. Small quantities of solvents would be used at the Pilot Plant under fume hoods, where emissions would be captured and vented to the atmosphere. The amount of solvent lost to evaporation would not be significant.

Purification and recovery processes at the Pilot Plant would require buffers including trisodium phosphate, sodium dihydrogen phosphate, disodium phosphate, and sulfuric and

hydrochloric acids. Dilute aqueous solutions which are prepared with the buffers would be a minor potential source of fugitive emissions vented through the Pilot Plant's fume hoods. None of these are on the BAAQMD's toxics list.

Radionuclides in extremely small quantities would be used and stored only in laboratory areas of the Pilot Plant. Although BAAQMD regulates radionuclide emissions under its toxics policy, potential release from the proposed project would not qualify as significant. Estimated radionuclide use at the Pilot Plant would be five percent or less of the maximum allowable under licence.¹³

Six fume hoods are incorporated in the Pilot Plant design to vent fumes from chemicals handled in open systems by Chiron personnel. Fume hoods are at negative pressure with respect to the building's interior, and escape gasses would pass to the atmosphere through a stack above the building. These emissions would not be significant.

Odor. The fermentation process would generate a yeast smell, similar to a brewery. Other organic laboratory chemicals used may also have odors, but would be emitted in very small quantities. Based on experience at Chiron's other facilities, odors would not be expected to be significant. If odors were a problem, scrubbers could be installed on the roof of the plant.

MITIGATION MEASURES

Construction Activities

Even though the following construction mitigation measures are not strictly required to protect public health, their implementation would reduce the potential for nuisance due to dust and odors: All construction contracts should require watering in late morning and at the end of the day; the frequency of watering should increase if wind speeds exceed 15 mph. Conditions of approval should also require daily cleanup of mud and dust carried onto street surfaces by construction vehicles. Throughout excavation activity, haul trucks should use tarpaulins or other effective covers. Upon completion of construction, contractors should take measures to reduce wind erosion. Replanting and repaving should be completed as soon as possible. Unnecessary idling of construction equipment should be avoided.

Operational Activities

Implementation of the roadway improvements proposed by in Section 4.2, Transportation, would substantially improve traffic flow and air quality at the I-80 Northbound Ramps/Powell intersection.

As a prerequisite to Pilot Plant construction, the Bay Area Air Quality Management District would perform a review of the Plant's potential air emissions to determine whether Authority to Construct and a Permit to Operate are required.¹⁴ This review would evaluate ethanol, NO_x, and toxic air contaminants compared to BAAQMD standards and may include a risk screening analysis. Should abatement devices (scrubbers, filters, or other equipment) be required to meet standards, the BAAQMD would mandate them or not issue permits. Either way the impacts of facility operation would not be significant, although traffic-related emissions would be.

¹BAAQMD Regulation 2, Rules 2-1-301 and 2-1-302.

²BAAQMD Risk Management Policy, February 29, 1988.

³Op. cit.

⁴Background values were obtained from Air Quality and Urban Development, BAAQMD, November 1985, Table VI-C-2, p. VI-18.

⁵The particulate emission factor was obtained from Air Quality and Urban Development, BAAQMD, November 1985, Table VI-C-2, p. VI-18.

⁶Zeev Benoni, Technical Vice President, Fleischmann's Yeast, in verbal communication of March 15, 1989.

⁷BAAQMD Regulation 8, Rule 2.

⁸Henry Hilkin, Planning and Research, BAAQMD, in verbal communication of March 15, 1989.

⁹Tom Sanders, Manager, Business Development, Chiron Corporation, in verbal communication of March 16, 1989.

¹⁰Op. cit.

¹¹Tom Sanders, Chiron Corporation, facsimile transmission to EIP Associates, March 21, 1989.

¹²BAAQMD Regulation 9, Rule 9-3-301.

¹³Charles Keil, Industrial Hygiene Manager, ERM-West, in a technical report for EIP Associates.

¹⁴Milton Feldstein, Air Pollution Control Officer, BAAQMD, in comment letter on proposed Chiron Pilot Plant dated January 24, 1989.

4.6 WASTEWATER TREATMENT AND DISCHARGE

SETTING

The City of Emeryville receives sewage treatment service from the East Bay Municipal Utilities District (EBMUD). Wastewater collected from homes and businesses in the City of Emeryville is conveyed by a system of underground pipes to EBMUD's Special District Number 1 Waste Treatment Plant in Oakland. This facility has the capacity to provide primary treatment of approximately 290 million gallons daily (MGD) and primary and secondary wastewater treatment of about 168 MGD. The system is presently operating at 60 percent of capacity.¹

EBMUD has enacted an ordinance that regulates the nature of wastes that are allowed to enter its conveyance and treatment system.² Certain substances are prohibited from discharge to prevent danger to sewage treatment plant workers and damage to EBMUD's facilities. The concentration or strength of other substances is limited to the values shown in Table 4.6-1.

EBMUD classifies wastewater dischargers in accordance with the principal activity conducted upon the premises and is authorized to issue Wastewater Discharge Permits for dischargers in "Critical Industries" whose wastewater requires special regulation. As a laboratory facility, the Chiron Pilot Plant would be subject to EBMUD permit requirements pertaining to this classification.

IMPACTS

Pilot Plant operations would produce wastewater which would be discharged into the municipal sewer system. Wastewater would be generated primarily by manufacturing processes, while some sanitary wastes would be generated by bathrooms and other employee facilities. It is estimated that manufacturing process water requirements are approximately 20,000 gallons per week.³ Assuming that each employee produces 25 gallons of sanitary wastewater each day and that most of the process water becomes wastewater, the Pilot Plant would discharge about 4,500 gallons per day to the municipal sewage collection system. Untreated, Chiron's raw wastewater would comply with these limits with the exception of pH.

TABLE 4.6-1
WASTEWATER POLLUTANT CONCENTRATION LIMITS
FOR DISCHARGE TO EBMUD SEWER SYSTEM

Arsenic	2 mg/l
Cadmium	1 mg/l
Chlorinated Hydrocarbons (total identifiable)	0.5 mg/l
Copper	5 mg/l
Cyanide	5 mg/l
Iron	100 mg/l
Lead	2 mg/l
Mercury	0.05 mg/l
Nickel	5 mg/l
Oil and Grease	250 mg/l
pH - not less than	5.5
Phenolic compounds	100 mg/l
Silver	1 mg/l
Temperature	150°F
Total Chromium	2 mg/l
Zinc	5 mg/l

Figure 4.6-1 shows a conceptual diagram of liquid waste segregation and treatment at the Chiron Pilot Plant. As discussed in Section 4.2, hazardous chemical wastes would be collected separately within the facility and trucked to an approved hazardous waste treatment or disposal facility. Other liquid wastes would be segregated into three streams. Sanitary wastes would be discharged directly to the City sewer. Acids and alkalis, uncontaminated with biological materials, would be routed to a neutralization tank. Any wastewaters containing biological materials would be routed to the sterilizer or "kill system" and on to the neutralizer. In the neutralizer, the pH of the wastewater would be adjusted until it would meet the standard for discharge of pH 5.5 or greater. The contents of the neutralizer tank would be tested prior to releasing wastewater to the municipal sewer system.

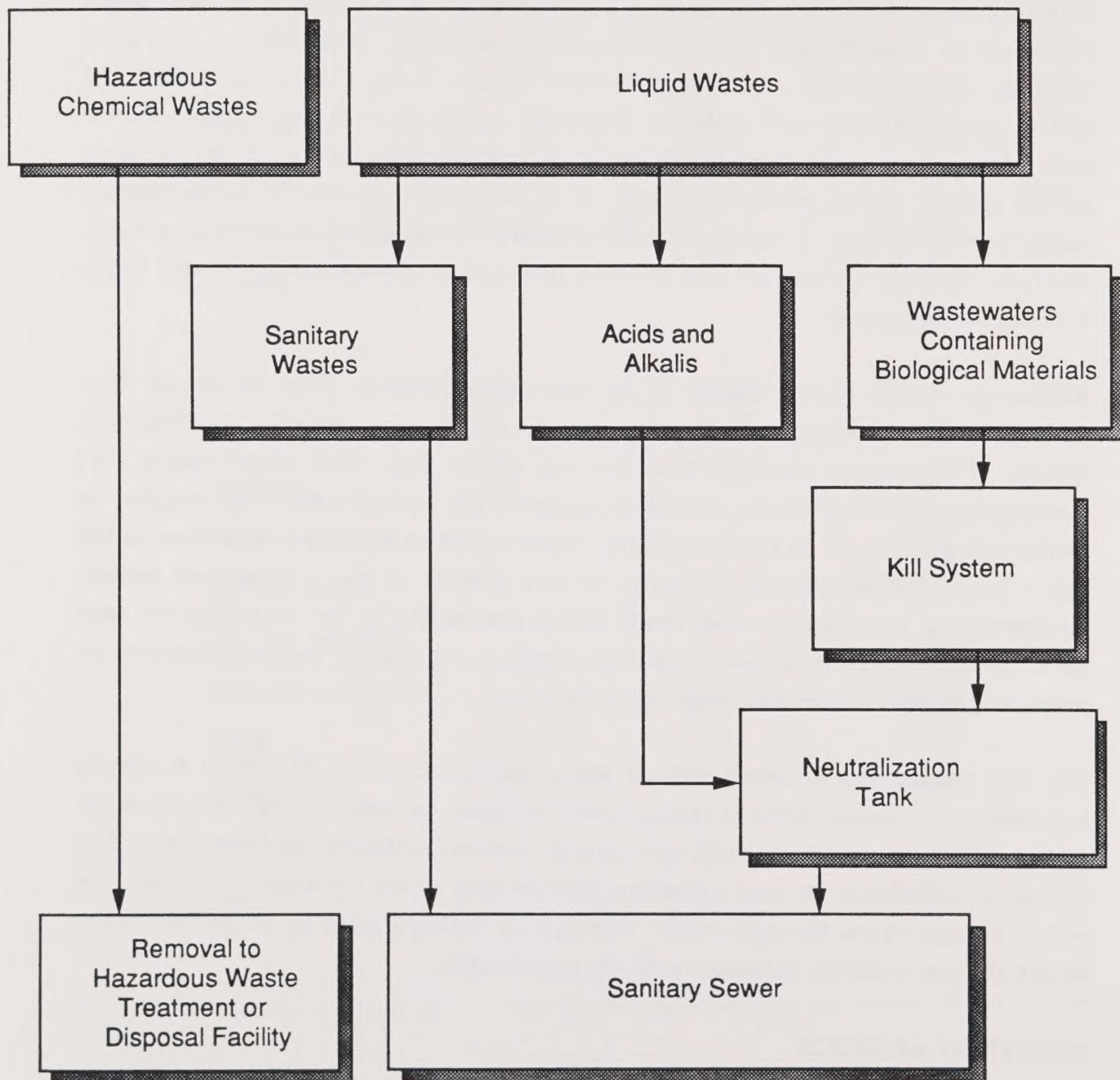
Neither the volume nor the quality of the wastewater discharge from the Chiron Pilot Plant would have an adverse effect on the municipal wastewater collection and treatment system. Pretreatment facilities built into the Chiron Pilot Plant would ensure that discharged waste is compatible with other wastes in the municipal collection system. A further safeguard would be provided in that wastes would be discharged in batches to the sewer system, rather than continuously. If any element of the pretreatment system malfunctioned, improperly treated waste would accumulate in the neutralization tank until the failed system element could be repaired. Assuming proper operation, no improperly treated wastewater would enter the sewer.

The total treated cell biological effluent waste load for the entire Pilot Plant facility is expected to be around 2,000 kilograms/month of yeast released to the EBMUD sewer system after heat sterilization (kill system) and chemical neutralization. This waste load should average around 5% total suspended solids or less, so the net wastewater flow rate will be at least 40,000 liters per week. This organic loading is small by comparison to the output of other industrial factories in nearby communities.

MITIGATION MEASURES

None required.

LIQUID WASTE SEGREGATION AT CHIRON PILOT PLANT



¹Barbara Hagan, Wastewater Control Representative, East Bay Municipal Utilities District, in verbal communication of March 8, 1989.

²Ordinance No. 270, Title II, Section 3(a).

³Bob Konopacz, Manager, Engineering and Manufacturing Resources and Project Engineer, Chiron Corporation, in verbal communication of March 8, 1989.

4.7 HYDROLOGY AND WATER QUALITY

SETTING

The 2.6-acre site of the proposed project is located near the edge of the San Francisco Bay on land that has been reclaimed from the Bay by filling activities. The site is a lowland area located in the western portion of Emeryville and is bounded on the west by the Eastshore Freeway (I-80/880). Mud flats and the San Francisco Bay lie beyond the Freeway to the west.

The project site is within the drainage area of Temescal Creek. Temescal Creek originates in the East Bay hills and flows west toward the San Francisco Bay draining a largely urbanized area. Creek flows are partially regulated by Lake Temescal, a reservoir located near the intersection of Highway 24 and the Warren Freeway, about 3.5 miles east of the project site. In the project vicinity, the creek is contained in a rectangular concrete channel, 36 feet wide and 12 feet deep. The creek channel is currently surrounded by a six-foot high chain-link fence and is accessible only through a locked gate. The creek mouth lies about 200 feet west of the project site, beyond the I-80 Freeway. This lower portion of the channel is subject to tidal action, with an approximate daily range of three to six feet. Water depths within the channel range from zero to six feet, depending on the tides.

The creek's outfall into San Francisco Bay is an area known as the Emeryville Crescent. The Emeryville Crescent contains salt marsh and mudflat habitats, increasingly rare natural areas in the bay. The Crescent has a high value for wildlife habitat, specifically for striped bass spawning and for waterbirds. Species of special concern which occur there are salt marsh harvest mouse (Reithrondontomys raviventris), California clapper rail (Rallus longirostris obsoletus), California black rail (Laterallus jamaicensis coturniculus), California least tern (Sterna antillarum browni), California brown pelican (Pelecanus occidentalis californicus), Alameda salt marsh song sparrow, (Melospiza melodia pusillula), and snowy plover (Charadrius alexandrinus). The California Department of Parks and Recreation has recommended that 500 acres of the Emeryville Crescent be acquired as part of the San Francisco Bay National Wildlife Refuge system. The Crescent also has been proposed as part of an East Bay Shoreline Park in Contra Costa and Alameda Counties.

Water quality within the creek varies on a seasonal basis. During the dry summer months, tidal action is the dominant influence on water quality; the water in the creek is essentially the same as that of the Bay. Water quality within the Bay has been adversely affected over time as a result of increasing freshwater diversions (which decreases the flushing of contaminants from the Bay), point-source discharges such as municipal and industrial waste discharges, and non-point discharges such as urban and agricultural runoff. During the rainy season, urban stormwater runoff tends to be the dominant influence. Urban stormwater typically contains high levels of suspended solids and biochemical oxygen demand (BOD), as well as traces of gasoline, oil, grease, lead, rubber, and other contaminants associated with motor vehicle operation. Organic compounds such as fertilizers and pesticides are often present, as are other toxic compounds.

Temescal Creek is owned, operated and maintained by the Alameda County Flood Control District. The District is legal owner of the channel, and as such their primary concern is in the area of flood control.

The project site itself was formerly an industrialized site that has recently been graded. Potentially hazardous substances exist in the soils of this site, as documented in Section 4.1.3. The original drainage patterns have been considerably altered, and no obvious patterns of drainage presently exist. However, runoff most likely occurs via overland flow to Temescal Creek, then on to the San Francisco Bay. According to the Federal Emergency Management Agency (FEMA), the entire City of Emeryville (including the project site) is located in Zone C, outside the range of inundation of the 500-year flood. However, in the unlikely event of the failure of the dam at Lake Temescal, the project site would be inundated by the associated flood wave as it progressed west toward the San Francisco Bay.

IMPACTS

Implementation of the proposed project would result in covering the existing bare soils with buildings, parking lots and sidewalks, all of which would contribute to a decrease in the percolation of stormwater into the soil and a corresponding increase in surface runoff. This impact would be largely of concern to downstream areas that could be exposed to an increased risk or severity of flooding; however, because the project site is located near the Bay, downstream impacts on urbanized areas would not be noticeable. In addition, the Temescal Creek channel is designed to accommodate full buildout of the watershed. For these reasons, the impact is judged to be less than significant.

The quality of stormwater runoff from the project site would be typical of that from other developed areas, containing high levels of suspended sediments and BOD, and traces of other contaminants. The level of contamination from the site itself would not be significant, but would contribute to the cumulative contamination of the San Francisco Bay from non-point source pollution.

Direct drainage from the buildings, parking lots, access roads, and landscaped areas of the site may introduce oils, trace metals, fertilizers and pesticides into the creek, thereby degrading downstream water quality. However, the amount of contaminants from this source and its effect on plant and animal species is not expected to reach significant levels.

As stated in the Setting section above, the project site is not located within the 500-year floodplain, but would be inundated in the event of dam failure at Lake Temescal. Thus, implementation of the proposed project would expose people and property to flooding in the unlikely event of dam failure. This could be considered a potentially significant impact of the environment on the project. (It should be noted that no dam has ever failed during an earthquake in California; even during the 1906 San Francisco earthquake, some 16 dams were located within five miles of the San Andreas fault, but none suffered significant structural damage.)

During construction, the potential for erosion and sedimentation exists as bare soils are exposed to the erosive forces of wind and rain. Soil erosion could lead to sedimentation into Temescal Creek and the Bay, thus adversely affecting flood-carrying capacity and biological resources; wildlife utilizing pickleweed and cord grass flats in the Emeryville Crescent (including some species with an endangered status) would be adversely affected if a high rate of sedimentation covered over and therefore eliminated vegetation that these species use as food and cover.

The project site has had a history of soil contamination as discussed in Section 4.1.3, Soils Contamination. If eroded material and runoff from the site were to contain toxicants, there would be a potential for bioaccumulation in shellfish and other filter and deposit feeders. Over the long term, a steady input of toxicants could reduce vigor and reproduction of these organisms and their predators, leading to declining populations.

Therefore, erosion and sedimentation during construction is a potentially significant impact.

MITIGATION MEASURES

The drainage plans for the site would be subject to approval by the City of Emeryville and the ACFCF.

Ensuring the structural integrity of the dam at Lake Temescal is beyond the authority of the project sponsors. However, by state law, the dam must meet or exceed the requirements of the California Department of Water Resources, Division of Safety of Dams.

An Erosion and Sediment Transport Control Plan would be developed by the project sponsor prior to the start of construction. This plan would be required as part of the Grading Permit approval process, and would be subject to approval by the City Engineer. The plan would be designed to prevent sediment from leaving the construction site through the use of silt fences, straw bales, perimeter ditches, or other similar techniques, and limiting construction to the dry season. Incorporation of this plan into the project design would reduce the potential erosion and sedimentation of construction activities to a less than significant level.

4.8 GEOLOGY, SOILS AND SEISMICITY

Exploratory borings¹ and an environmental risk assessment² were prepared for the proposed project and updated in 1988.³ Detailed excavation and foundation recommendations have not been prepared. The following information is based on a review of the existing geotechnical documents, of the City's Geotechnical Hazards Policies in the General Plan, and pertinent maps and reports published by the City, the California Division of Mines and Geology, the United States Geological Survey, and the Federal Emergency Management Agency (FEMA). The project site is in an area of geologic concern related to the existence of Bay mud below the site and to the violent groundshaking the site would experience during a major seismic event.

SETTING

Local Geology

The surface of the hills east of Emeryville consist of Tertiary sedimentary and volcanic rocks. The bedrock underlying the surface deposits is the Franciscan assemblage, a widespread, complex association of rocks formed from marine sediments approximately 140 million years old. It is predominantly graywacke (a dirty sandstone), but shale, meta-graywacke, greenstone, chert, and limestone also form part of the assemblage. These materials are not exposed at the project site. The geologic formations belong to the Coast Ranges geomorphic province, which has undergone repeated episodes of folding, faulting and uplifting during the past several million years. The San Andreas seismic zone divides the province and contains numerous active faults that continue to shape the northern California landscape.⁴

The oldest alluvial fan deposits consist of the poorly consolidated interbedded silt, sand and gravel of the Alameda formation. These are overlain by as much as 15 feet of alluvial sediments (sand and silt) of the Temescal formation. In the vicinity of the project site, this formation is overlain by 30 feet of Merritt formation beach and windblown sand, and up to 30 feet of Bay mud.⁵

Since the late 1800s, the Emeryville shoreline has been extended west toward the Bay by the placement of imported fill over the Bay mud. About one-third of the land area of the City consists of fill placed over mud. The composition of the fill is highly variable, but

generally appears to consist of clayey and/or sandy soils combined with construction and industrial waste materials.⁶

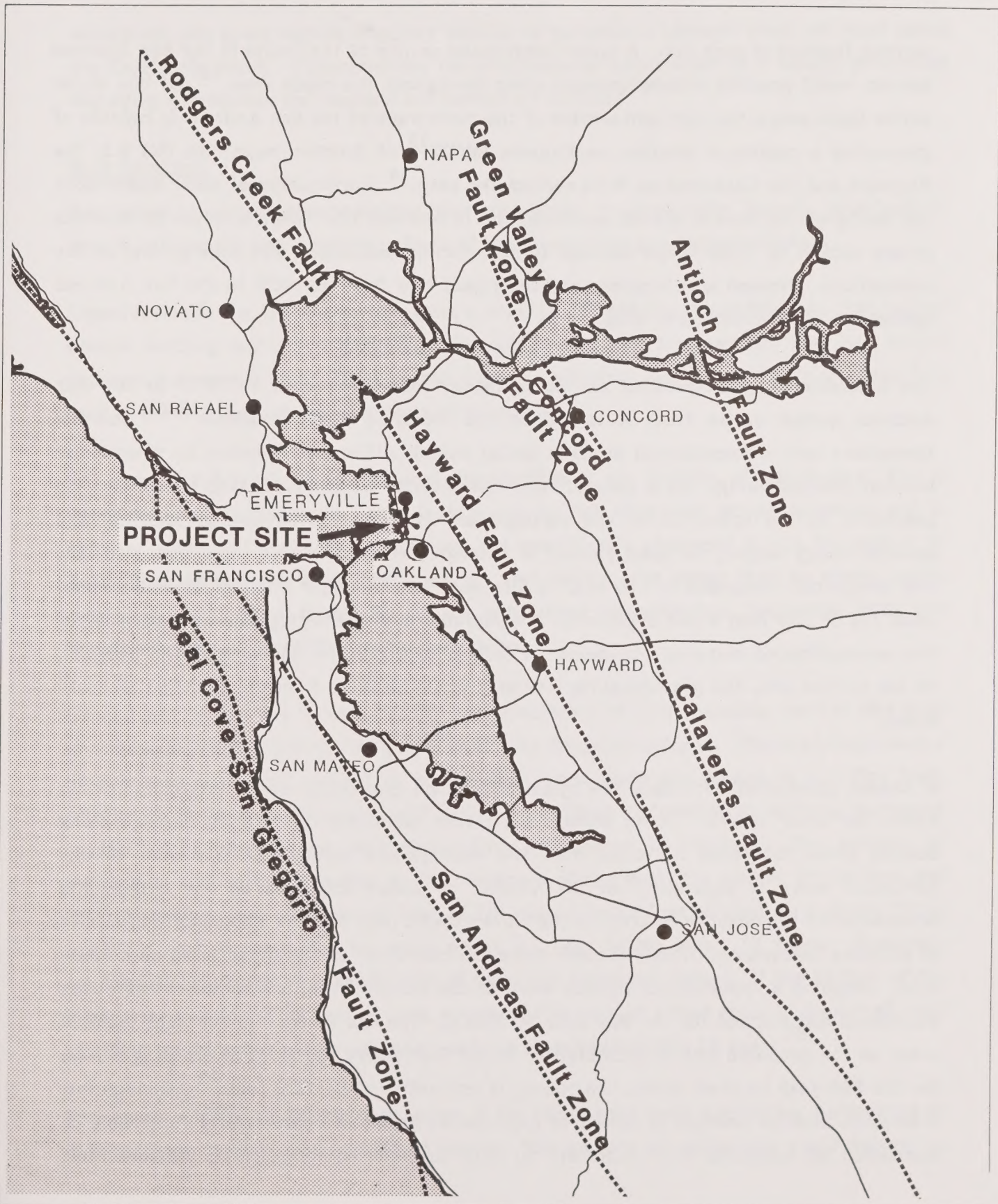
According to the geologic map of the Oakland West quadrangle,⁷ the surface of the site is about 10 feet above mean sea level (+10 feet MSL) and consists of artificial fill, adjacent to, and probably underlain by, the alluvial fan deposits of the Temescal formation, followed by layers of mud, silt, silty clay, sand and gravel to a depth of at least 76 feet below the ground surface. The surface of the Franciscan assemblage bedrock is at more than 300 feet below sea level.

Subsurface material encountered in exploratory borings for foundation investigations at the project site consists of 8 to 12 feet of fill underlain by as much as 29 feet of Bay mud.⁸ The upper surface of the mud is a relatively stiff, desiccated crust under which is soft, highly compressible organic mud. The mud is underlain by moderately firm sandy clay containing chips of rock. The groundwater table was encountered between about 5 and 16 feet below the ground surface. The exposed ground surface is not erosion prone because it has been compacted by vehicular and pedestrian traffic.

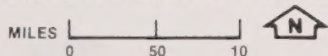
SEISMICITY

The project site, like the rest of the Bay Area, is in a region of high seismic activity that annually experiences low- to moderate-magnitude earthquakes, epicentered along historically active fault zones. The nearest historically active zone is the Hayward fault, about 3 miles northeast of the site. Others include the San Andreas fault, about 15 miles southwest of the site, and the Calaveras fault, about 14 miles east of the site (Figure 4.8-1). These faults form part of the northwest-trending San Andreas system that crosses the mountainous terrain along both sides of San Francisco Bay. The Hayward and Calaveras faults follow the East Bay Hills of the Diablo Range. The main trace of the San Andreas fault follows the crest of the Santa Cruz Mountains. The Seal Cove segment of the San Gregorio fault, a potentially active zone within the San Andreas system, roughly follows the Pacific coast.⁹

Each of the historically active faults is in an Alquist-Priolo Special Studies Zone,¹⁰ but none crosses the project site.¹¹ Consequently, the potential for damage to the site by



SOURCE: CALIFORNIA DIVISION OF MINING AND GEOLOGY / JENNINGS



surface faulting is very low. A major earthquake on one of the faults in the San Andreas system would produce violent groundshaking throughout the study area.¹² Of the major active fault zones, the northern section of the main trace of the San Andreas is capable of generating a maximum credible earthquake (MCE)¹³ of Richter magnitude (M) 8.3; the Hayward and the Calaveras an M7.5 earthquake each.¹⁴ Earthquakes of these magnitudes are sufficient to create ground accelerations in bedrock and in unconsolidated deposits severe enough to cause major damage to structures, foundations and underground utility connections. Ground accelerations at the project site from an MCE in the San Andreas system would be in excess of 0.5g.¹⁵

The intensity of groundshaking at the epicenter associated with an MCE in the San Andreas system varies from X to XII on the Modified Mercalli Scale.^{16,17} Bedrock formations and unconsolidated deposits (soils) exhibit different responses to seismically induced groundshaking. As a general rule, the severity of groundshaking increases with proximity to the epicenter of the earthquake. However, given similar location and seismic energy output, the least amount of damaging vibration would occur on a site that was completely composed of bedrock. A site underlain by major thicknesses of alluvium, loose fill or Bay mud would experience considerable more damaging vibration because of the unconsolidated material's tendency to deform to a greater degree than the bedrock. At the project site, the groundshaking intensity would be IX to X on the Modified Mercalli Scale.¹⁸

A hazard associated with deep sea seismicity is the generation of tsunamis, commonly known as "tidal" waves. These seismic sea waves can cause devastating damage along coastal areas thousands of miles from the earthquake's epicenter. The size of any particular wave is dependent on the volume of water displaced at the origin, the orientation of the coast in relation to the wave's travel path and the slope and irregularity of offshore topography. These factors make the character of any given wave unpredictable. Based on a hypothetical 20-foot wave at the Golden Gate, run-up zones have been calculated and mapped for the Bay area by FEMA. The run-up for the 100-year tsunami event at the proposed site is estimated to be 6.7 feet above the level of standing water; for the 500-year tsunami event, the run-up is estimated to be 12.5 feet.¹⁹ Although low coastlines, such as beaches or dunes, or bays and estuaries are particularly vulnerable to inundation by tsunamis, it is important to note that the combination of vertical fault

movement and great depths of water needed to generate a tsunami does not exist along the California coast. Consequently, the simultaneous occurrence of a locally generated damaging earthquake and tsunami are extremely unlikely.²⁰

Soils Response

Responses to severe groundshaking that can occur in loose soils include liquefaction, ground settlement and landslides. Each of the phenomena are discussed below.

Liquefaction is the transformation from a solid to a liquid ("quicksand") state that causes ground settling and lurch cracking. Earthquake-induced liquefaction does not affect bedrock; however it does affect certain types of alluvium, as well as lenses of clean fine sand in the Bay mud, under conditions of saturation.

The potential for seismically-induced liquefaction in the vicinity of the project site is considered low to moderate,²¹ but locally can be high near open stream channels and in areas of loose sandy deposits. Although not specifically addressed in the Geomatrix or Earth Metrics reports, examination of the test boring logs shows that no clean, loose, saturated sands were found during the subsurface investigation, indicating that the liquefaction potential of the building site is low.

Ground settlement is a function of the compressibility of loose deposits, such as Bay mud or uncompacted fill, and the weight of overlying fill or structures. The semi-fluid nature of Bay mud renders it subject to compression when loads are placed on it. The load, whether it is fill or a structure, will settle, sometimes differentially, during a period of several years, decades or centuries before equilibrium is reached. The amount of settlement will vary, depending on the thickness of the mud, the weight of the load and rate of loading. For example, 10 feet of fill placed on 50 feet of mud, in a single filling operation, can be expected to settle about 4.5 feet within about 12 years. However, equilibrium would not be reached until at least 200 years had passed. If the 10 feet of fill were placed on top of 25 feet of mud, a total settlement of 3 feet could be expected, half of which would occur within one year, and the remainder within 20 years.²²

Settlement within the fill also can occur, if the fill has not been completely compacted or if it has been derived from a dredged source. The amount of settlement would depend on

the characteristics of the dredgings. If the dredged soil is predominantly silty and clayey, the post-construction settlement could be similar to that expected from Bay mud. Dredgings composed primarily of sand are not susceptible to post-construction settlement unless the sand fill has an extremely low density.

Earthquake-induced landsliding of steep slopes can occur in unconsolidated deposits (soils) along stream channels. Firm bedrock usually can stand in steeper, more stable slopes than soils are able to maintain. Landslides, earthslips, mudflows and soilcreeps are all expressions of soil conditions related to the instabilities created by steep slopes, shallow soil development, the presence of an excessive amount of water, or the lack of shear strength in the soil. Each of these conditions is observable in Alameda County, but usually is reported simply as a "landslide." Earthquake activity does induce some landsliding, but most slides result from the weight of rain-saturated soil and rock exceeding the shear strength of the underlying material. Erosion of supporting material at the toe of a landslide-prone channel wall further contributes to instability.

IMPACTS

Introduction

Section 15382 of the CEQA Guidelines²³ defines a significant effect on the geologic environment as "a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project." Further, Section 15126 (a) of the Guidelines stipulates that the EIR analyze "significant environmental effects the project might cause by bringing development or people into the area affected." The example used in the Guidelines is that of a subdivision astride an active fault having the effect of attracting people to an area where they would be exposed to seismic hazards.

The examination of geology, soils and seismicity issues in this EIR is based on information obtained from site observation, from the review of existing literature, both published and unpublished, and from personal and telephone communications with persons involved with or concerned about the proposed project.

The potential geologic, soils and seismic effects of the proposed development plan are considered from two points of view: the effects of the project on the environment and the

effects of the environment on the project. In the first category, the impacts of construction are considered. The basic criterion applied to the analysis of impacts in this category is whether or not construction of the project, as proposed, would create a fundamental change in the terrestrial framework that would last beyond the short-term construction period. Examples of this type of impact include the destruction of unique geologic features, the over-covering of highly productive topsoils, or an increase of seismic activity as a result of the implementation of the project.

In the second category, the geologic hazards that could endanger the occupants of the site are considered. The basic criterion applied to the analysis of impacts in this category is whether or not implementation of the project, as proposed, would expose people in the City of Emeryville to unmitigated geologic hazards caused by seismically-induced groundshaking, secondary seismically induced ground failure, rock or soil instability, or other soil conditions. It is recognized that human activities have other, nonhazardous, effects on the geologic, soils and seismic environment, but, except as the effects relate to the protection of life, they are not considered significant in the planning context of the proposed project.

Surface Faulting

Branches of numerous earthquake faults, including the Hayward, Calaveras and San Andreas faults, are mapped within about 16 miles of the project site. Other than these three major active faults, most of the faults show no evidence of historical activity. Trace faults within the larger San Andreas system are considered inactive and are not mapped in an Alquist-Priolo Special Studies Zones by the California Division of Mines and Geology. None of them pass through the proposed project site. Consequently, they are not considered to pose surface faulting hazards to the population of the site and are not considered the source of significant surface faulting impacts under CEQA.

Tsunamis

The 100-year tsunami run-up is about 6.7 feet above the level of standing water; the 500-year run-up is about 12.5 feet. To consider a worst-case condition, standing water must be assumed to be near the level of maximum high tide (about +3.3 feet MSL, which occurs

about five times during an average year)²⁴ bringing the respective run-up levels to about +10 feet msl and about +15.8 feet msl. The 100-year level, which is the usual design parameter, would be about the same elevation as the existing ground surface of the site. The 500-year level would be about 5.8 feet above the existing ground elevation of the site. Interstate 80, which rises to an elevation of more than +10 feet MSL in the vicinity west of the site, would act as a seawall, offering some protection to the project site during a 100-year tsunami run-up event. The highway, however, does not rise above +15 feet MSL in the immediate vicinity of the project site, and would be flooded by a 500-year tsunami run-up event. Because the site would be protected during the 100-year/maximum high tide event (+10-foot msl run-up), due to its elevation and location, and because the 500-year/maximum high tide event (+15.8-foot msl run-up) has only a 0.003 percent chance of occurring in a given year,²⁵ tsunamis are not considered to be substantial hazards to the future population of the project site and are not considered significant impacts under CEQA.

Groundshaking

The severity of expected seismically induced groundshaking is related to the distance from the epicenter of the earthquake and to the type of bedrock or surface deposits in a study area. As shown on the seismic shaking intensity map for the East Bay, the project site would be subjected to violent groundshaking (Modified Mercalli Intensity X to XII) during a maximum credible earthquake along the one of the active faults in the southern Bay area. Without mitigation, this potential groundshaking intensity would be considered a significant impact under CEQA because it constitutes a real geologically hazardous condition for the future population of the site.

Grading and Foundations

Grading activities throughout the site would be carried out to establish sound soil support for the foundations of new structures and roads, possibly including excavating into the fill and the Bay mud for a pile-driving pit and pile cap for the proposed structure. The subsurface investigation of the project site indicates that these soft compressible soils would not provide adequate support for the structure. Unacceptable amounts of differential and total settlement would occur as a result of these soils compressing or collapsing under the weight of the structure supported on them. Without mitigation, the

existence of weak soils, such as loose fill and the Bay mud, at the project site would be considered a significant impact under CEQA because it would create geologically hazardous conditions for the future population of the site.

Grading activities also have the potential to generate substantial amounts of loose soil and rock during the clearing and excavation phases of the construction period. In portions of the site adjacent to drainageways, disrupted earth materials could be transported from the construction site into local receiving waters by stormwater runoff, by washwater runoff, or by excess water used for dust control. Without mitigation, this potential impact would be considered significant under CEQA for two reasons: it could result in substantial turbidity in the receiving waters (San Francisco Bay), thereby reducing the viability of the habitat; or it could create or exacerbate flood hazard conditions for the population of the adjacent areas downstream by partially blocking the flow of stormwater runoff (see Hydrology and Water Quality section of this EIR).

MITIGATION MEASURES

Surface Faulting

Since the identified earthquake fault traces do not pass through the project site, no mitigation measures are required under CEQA.

Tsunamis

Since the project site would be protected during the 100-year event, and because the 500-year event has only a 0.003 percent chance of occurring in a given year, no mitigation measures are required under CEQA.

Groundshaking

Several options for creating stable subsurface conditions should be considered. These include the use of deep foundation systems to reduce and control vibration and settlement, or the use of some type of soil compaction or solidification process to achieve the same results. A deep foundation system of cast-in-place piers or driven piles is recommended by the project geotechnical engineer.

The City ordinance requires Building Permits for all new construction activity. Site-specific geotechnical investigations for the grading and foundation design, and for the loading specifications of the proposed structures would be prepared by a California Certified Engineering Geologist, or a team composed of a California Registered Geologist and a California Registered Professional Engineer. Standards for anti-seismic construction under the City's Building Permits are specified by the Uniform Building Code (UBC) requirements for Seismic Zone 4. To determine the appropriate design specifications for anti-seismic construction, the geologist/engineer must use UBC requirements for Seismic Zone 4 as the minimum acceptable standard.

The damaging effects of severe groundshaking would be reduced or eliminated by adhering strictly to the geotechnical recommendations for the structure proposed. Incorporation of these parameters into the project design should reduce the potential groundshaking impacts to a less than significant level.

Grading and Foundations

A review of the project grading plan would be included in the City's Building Permit application process required for new construction activity. As stated previously, site-specific geotechnical studies would be prepared because the property is underlain by unstable soils, i.e., loose fill and Bay mud. The studies would indicate the appropriate specifications needed to produce a stable site using a cast-in-place pier foundation or a driven-pile foundation. The report of the study would contain recommendations for site preparation that would be incorporated into the project design. These recommendations would include, but not be limited to, such issues as surface drainage, subdrainage, removal of weak soils and replacement with engineered backfill, location of cuts or fills, estimated depths of foundation elements, and design earthquake parameters. Incorporation of these recommendations into the project design would reduce the potential soil instability impacts, i.e., liquefaction, differential settlement, and total settlement, to a less than significant level.

Where grading activities such as those at the proposed project have the potential to reduce the viability of stream habitat or generate flooding by the addition of loose soil and rock to the drainageways, an Erosion and Sediment Transport Control Plan would be required as part of the Grading Permit approval process as discussed in Section 4.7, Hydrology and Water Quality.

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- ¹C. Basore, Principal Engineer, Geomatrix Consultants, Inc., Exploratory Borings, Judson Steel Corporation Site, Emeryville, California, 13 January 1986, prepared for The Martin Company, Pleasanton, California, Geomatrix Project 1219A.
 - ²Earth Metrics, Incorporated, Environmental Risk Assessment for the Judson Steel Site, Parcels 1 and 2, Emeryville, California, September 1987, updated January 1988, prepared for The Martin Company, Pleasanton, California.
 - ³Ibid.
 - ⁴Radbruch, D.H., Areal and Engineering Geology of the Oakland West Quadrangle, California, U.S. Geological Survey, Miscellaneous Geologic Investigations Map I-239, 1957, scale 1:24 000.
 - ⁵Earth Metrics, 1988, op. cit.
 - ⁶City of Emeryville General Plan, adopted by City Council, 2 June 1987, Chapter V, Public Health and Safety.
 - ⁷Radbruch, 1957, op. cit.
 - ⁸Geomatrix, 1986, op. cit.
 - ⁹Jennings, C.W. et al, Fault Map of California, Geologic Data Map Series, Number 1, California Division of Mines and Geology, 1975, scale 1:750 000.
 - ¹⁰Alquist-Priolo Special Studies Zones: the State of California has delineated special studies zones around active and potentially active faults in the state. The zones extend about 700 feet on either side of identified fault traces. No structures for human occupancy may be built across an identified active fault trace. An area of 50 feet on either side of an active fault trace is assumed to be underlain by the fault, unless proven otherwise. Proposed construction within the Special Studies Zone can take place only following the completion of a geological report prepared by a California Registered Geologist.
 - ¹¹California Division of Mines and Geology, Alquist-Priolo Special Studies Zone Map, Oakland West Quadrangle, effective date July 1974, scale 1:24 000.
 - ¹²Borcherdt, R.D., J.F. Gibbs and K.R. Lajoie, Map showing maximum earthquake intensity predicted in the southern San Francisco Bay region, California, for large earthquakes on the San Andreas and Hayward faults, U.S. Geological Survey, Miscellaneous Field Investigations Map MF-709, 1975, 3 sheets, 11 pages of text, map scale 1:125,000.

- ¹³ Richter Scale: a logarithmic scale developed in 1935/36 by Dr. Charles F. Richter and Dr. Beno Gutenberg to measure earthquake magnitude by the amount of energy released, as opposed to earthquake intensity as determined by local effects on people, structures, and earth materials.
- ¹⁴ Maximum credible earthquake: the largest Richter magnitude (M) seismic event that appears to be reasonably capable of occurring under the conditions of the presently known geological framework. In the Bay Area, M8.3 is the maximum credible earthquake for the San Andreas fault, M7.5 for the Hayward and Calaveras faults, and M7.0 for the Rodgers Creek and Green Valley-Concord faults.
- ¹⁵ Greensfelder, R.W., Maximum Credible Rock Acceleration from Earthquakes in California, California Division of Mines and Geology, Map Sheet 23, 1974, scale 1:2 500 000. The value of "g" equals the acceleration of gravity, in this case expressed as an horizontal force, at the rate of 32 feet per second squared.
- ¹⁶ "Section 15, Natural Hazards, Background, Issues", San Mateo County General Plan, November 1986.
- ¹⁷ Mercalli scale: an arbitrary scale of earthquake intensity, ranging from I (detectable only instrumentally) to XII (causing almost total destruction), developed in 1902 by Giuseppe Mercalli. It's adaptation for North American conditions is known as the "modified Mercalli scale".
- ¹⁸ Borchardt, et al, 1975, op. cit.
- ¹⁹ Garcia, A.W., and J.R. Houston, Type 16 Flood Insurance Study: Tsunami Predictions for Monterey and San Francisco Bays and Puget Sound, U.S. Army Corps of Engineers Technical Report H-75-17, Hydraulics Laboratory, U.S. Army Engineers Waterways Experiment Station, Vicksburg, Mississippi, November, 1975, 263 pages, including 2 tables and 240 figures, scale 1:24 000.
- ²⁰ D. Pierzinski, "Tsunamis," in: California Geology, California Division of Mines and Geology, March 1981, volume 33, number 3, pages 58 through 61.
- ²¹ City of Emeryville General Plan, 1987, op. cit.
- ²² Geologic and Engineering Aspects of San Francisco Bay Fill, H. B. Goldman, editor, California Division of Mines and Geology, Special Report 97, San Francisco, California, 1969, 130 pages, 4 plates, map scale 1:79 200.
- ²³ Office of Planning and Research, CEQA: The California Environmental Quality Act, Statutes and Guidelines, 1986, revised June 1986.

²⁴ Elliot Sales Corporation, Dot's Fishing Guide and Tide Table Books, California Coast and San Francisco Bay Edition, Tocomo, Washington, 1979 through 1989.

²⁵ The 500-year tsunami has a 0.002 (two-tenths of one percent) probability of occurring in any given year. Maximum high tide has a 0.015 (one and one-half percent) probability of occurring in an average year (five maximum high tides out of 341 high tides per year). Thus the probability of a 500-year tsunami coinciding with a maximum high tide is $0.002 \times 0.015 = 0.00003$ (three thousandths of one percent).

4.9 VEGETATION AND WILDLIFE

SETTING

A field survey was conducted on the site on January 9, 1989. Flora and fauna species were identified with standard field manuals.¹ In its existing condition, the property is flat and abandoned without buildings or landscape features. The ground surface is either covered with pavement or consists of recently turned mounds of soil.

Vegetation

Because of the disturbed and barren conditions of the site, vegetation is sparse. The limited number of common weedy species which occur are: annual grasses, fennel (Foeniculum vulgare), Carolina geranium (Geranium carolinianum), red stem filaree (Erodium cicutarium), plantain (Plantago arvensis), and sweet clover (Melilotus albus). A few clumps of coyote bush (Baccharis pilularis var. consanguinea) grow on the outside perimeter of the site along with remnants of some landscape species: blackwood acacia (Acacia melanoxylon), and iceplant (Mesembryanthemum sp.). Landscape trees located along the Interstate 80 right-of-way are coast sandalwood (Myoporum laetum).

The original natural habitat of the site was probably coastal prairie with annual and perennial grasses and forbs on the uplands, and salt marsh vegetation along the unconfined banks of Temescal Creek to the north. Due to its existing disturbed condition, no endangered or rare plant species are known to occur on the site. None were sighted during the January 9, 1989 field survey.

Wildlife

The disturbed nature of the site, specifically the sparsity of vegetation, presents very few features to attract or support wildlife. The only wildlife species expected to occasionally visit the site in its present condition are birds well adapted to urban environments. Birds sighted during the January field survey were: killdeer (Charadrius vociferus), mourning dove (Zenaida macroura), and white crowned sparrow (Zonotrichia leucophrys).

Due to the disturbed condition of the site, no endangered or rare wildlife species are known to inhabit the site and none were sighted during the January 9, 1989 field survey.

Agency Policy

Policies regarding landscaping in new developments are included in the General Plan, however, these are mostly related to the aesthetic quality of landscaping rather than its biological value. The landscape element does state, however, that "appropriate species are native California plants or plants native to regions climatically similar to northern coastal California which require less water and are more pest- and disease-free than many commonly-used ornamental plants."

The General Plan also identifies Shellmound Street as a "Landscape Corridor."² Pedestrian routes and bikeways are suggested for the area, and various tree species are recommended for planting along the corridor. The City has discretion to recommend or approve other trees not contained in the list of recommended species.

IMPACTS

The biologically barren condition of the site will be improved by the proposed landscaping. Landscape trees, shrubs, and groundcovers will provide habitat for birds, small mammals and reptiles. However, none of the landscape plants proposed are native California species. Native plants tend to require less watering, fertilization and pest control; thus they are less likely to result in poor quality runoff in surrounding water bodies.

If eroded material and runoff from the project site contained toxic pollutants, there is the potential for bioaccumulation in shellfish and other filter and deposit feeders. Over the long term, a steady input of toxic pollutants could reduce vigor and reproduction of these organisms and their predators, leading to declining populations. Direct drainage from the buildings, parking lots, access roads, and landscaped areas of the site may introduce oils, trace metals, fertilizers and pesticides into the surface drainage thereby degrading downstream water quality. The amount of pollutants expected to enter the creek by runoff and the level of resulting environmental impact, however, are not expected to be significant.

MITIGATION MEASURES

The landscape plans should be revised to include native California shrubs and trees. Coyote bush, toyon (Heteromeles arbutifolia), and coast live oak (Quercus agrifolia) would be good upland species. These should be planted at a thick enough density to provide a visual screen.

The "Pedestrian and Bikeways Landscape Corridor" area should include landscaping vegetation which adds to the scenic and biological value of the site. Species selected for use should be compatible with the goals of the General Plan (i.e., creating a coherent "Landscape Corridor"). The vegetation selected should also be compatible with species selected for both other areas of the site and the proposed Shellmound Park site adjacent to the north.

¹ Munz, Philip, and David Keck. 1968. A California Flora and Supplement, University of California Press, Berkeley, CA.

McMinn, Howard, and Evelyn Maino. 1935. An Illustrated Manual of Pacific Coast Trees, University of California Press, Berkeley, CA.

University of California Cooperative Extension. 1985. Growers Weed Identification Handbook. University of California, Division of Agriculture and Natural Resources, Oakland, CA.

National Geographic Society. 1983. Field Guide to the Birds of North America.

² Sedway Cooke Associates, Emeryville General Plan, Adopted by City Council June 2, 1987, Figure III-24.

4.10 VISUAL QUALITY

A survey of the proposed project site was performed in January, 1989 by the EIR consultant to determine its visual character. The following discussion of visual quality is based on the results of this survey, an additional survey of surrounding land uses, analysis of the architectural drawings prepared for the Pilot Plant, and a review of the appropriate elements of the Emeryville General Plan. Potential changes to the existing visual aspect of the project site from development of the proposed project, and their degree of significance, are examined below.

SETTING

Existing Conditions

The 2.6-acre project site is located in a predominantly industrial and commercial area of the southwestern section of the City of Emeryville (the Bayfront Area). The Eastshore Freeway (I-80), an area of undeveloped land, a metal drum reconditioning firm, and a steel manufacturer surround the proposed project site as described in Section 4.1, Land Use and Planning. The site formerly contained industrial uses and is now vacant.

The site may be described as visually blighted. Exposed soil on-site is not landscaped and the disturbed ground surface is covered with industrial debris including metal pipe and broken concrete. Although the site itself is generally devoid of vegetation, some trees and large shrubs which are adjacent to the site provide a partial screen between the freeway and the site. Eye-level views from the site are limited by this buffer vegetation to the west, and by one- to five-story industrial structures in the remaining directions. From a second-story level, views would extend to the East Bay Hills, and across the San Francisco Bay. The I-80 freeway is not elevated at this location and, therefore, is not visible from ground level.

Project Description

Development of the proposed project would involve construction of a building which is partially two- and partially three-story with a mechanical penthouse on the currently vacant property. Parking areas and perimeter fencing would be added as site improvements. Landscaping would be introduced around the proposed structure and the perimeter of the site.

The Pilot Plant would consist of a generally rectangular building 175 wide and 217 long facing, but not aligned with, Shellmound Street. The building would have a total height of 67 feet, although the building facade would only reach about 40 feet. The remaining elevation would include both the penthouse, which would be set back and have painted, ribbed metal panels as equipment screens, and pyramidal roof elements to provide for visual relief. The Emeryville General Plan designates the area which includes the Pilot Plant site for development of low-rise (to three stories) buildings, to protect Bay views of buildings further inland.¹

The Pilot Plant's exterior would be primarily glass and consist of transparent or reflective surfaces. Glass proposed for the building is of three types: spandrel glass, vision glass and tinted vision glass. These materials are respectively opaque green, clear, and semi-transparent emerald green. A low (approximately 3-foot) panel stone base wall is proposed which would be a light-colored gray granite with pink undertones. Painted, formed, metal accents would separate and match the various horizontal glass elements (ribbons).

Vehicle circulation routes and surface parking would surround the Pilot Plant. The majority of the parking spaces would be provided to the east of the building, adjacent to Shellmound Street, with additional spaces to the south and west. Landscaping elements would be planted along the site's periphery to reinforce existing screening from the Eastshore Freeway and to screen parking areas from the south, as well as from Shellmound Street. A row of trees would be planted and aligned with the north-south axis (parallel to the building's long axis) to create an internal screen in the main parking area.

IMPACTS

The proposed project would substantially alter the existing visual character of the site and contribute to the introduction of a visually cohesive development to the City of Emeryville's Bayfront Area. The Pilot Plant would incorporate similar building materials and architectural style as the proposed Shellmound Park buildings immediately to the north. Landscaping materials and forms would also be congruous with those provided for Shellmound Park and would replace the existing blighted appearance with a more desirable and aesthetically pleasing environment. This change would be considered a beneficial impact of the proposed project.

Although the project would add a large building to a currently vacant site, it would not obstruct Bay views from surrounding vantage points, as west-pointing views of the Bay are possible from higher elevations only. Development of the Pilot Plant would, therefore, be consistent with the "building form" element of the General Plan. This element directs low-rise building scale development along the freeway (I-80) frontage.¹

The project design incorporates a number of features to diminish potential visual quality impacts of a new structure. The building would utilize several materials, with varying colors and levels of transparency, to break up potential large planar surfaces. Mechanical equipment, both at the ground level and in the penthouse, would be visually screened. Materials used for exterior surfaces would be non-reflective and would not produce substantial glare impacts.

MITIGATION MEASURES

Development of the proposed Pilot Plant would not create adverse impacts to the visual quality of the project site. It would, however, enhance the appearance of a visually barren landscape. As a suggested mitigation measure, the street tree policies of the City of Emeryville should be considered in the final design of the site.

¹Sedway Cooke Associates, Emeryville General Plan, Adopted by City Council, June 2, 1987, p. III-109.

4.11 CULTURAL AND HISTORIC RESOURCES

4.11.1 SETTING

The proposed project site is located in the general location of the Emeryville Shellmound (Alameda County site number 309, designated Ala-309), at one time the largest prehistoric shell deposit in California. The artifacts retrieved from the Emeryville Shellmound in the late 1800's to early 1900's formed the core materials for many of the statements on the development of regional Native American culture in the San Francisco Bay Area. Although the shellmound site has not been subject to archaeological excavation since 1926, artifacts taken from it at various times constitute a massive data base which has strongly influenced the development of cultural models in central California archaeology.

The project site consists of a 7.9-acre parcel which was formerly part of the Spanish Land Cession of San Antonio. The parcel is bisected by the concrete-lined channel of Temescal Creek. The present route of the channelized Temescal Creek is not the same as the original creek. This section of Temescal Creek has apparently been channelized through the remnant of the Emeryville Shellmound (Ala-309). Temescal Creek originally ran about 400 feet south of its current channel. South of the creek is the proposed site for Shellmound Park, with the Chiron Pilot Plant proposed for the area north of Temescal Creek.

Methodology

In August 1988, a literature search and ground surface evaluation of the proposed project site (including the Chiron Pilot Plant site) was conducted by a professional archaeologist from Archaeological Resource Service.¹ The primary focus of the evaluation was to establish the relationship between the project area and the recorded location of the Emeryville Shellmound. No subsurface investigations were performed as part of the August 1988 evaluation.

On June 14, 1989, Archaeological Research Service conducted a subsurface examination of soil profiles within the project area. The evaluation concluded that: 1) prehistoric shell midden is the dominant natural surface soil of the site, 2) this surface soil has been imported and mixed with industrial trash and waste, 3) the surface soil is underlain by large pieces of discarded metal slag and other fill material to depths of over six feet in

places, and 4) that no indications of intact prehistoric cultural deposits were observed at any location within the parcel. The complete text and maps of the August 1988 and June 1989 evaluations are provided in Appendix D of this EIR. These conclusions are explained briefly below.

Site Relationship to the Emeryville Shellmound

There is a small possibility that the site is located in the vicinity of the remnants of the Emeryville Shellmound. The proposed parcel, as mentioned, was determined to possess soils containing cultural artifacts. It appears that they have been placed on the site as fill.

Due to continual development of the area in the project vicinity and the use of fill to extend the shoreline of the bay westward, the shellmound had been extensively altered by construction activities by 1924. Since 1924, more of the shellmound has been moved or removed so that it is difficult to discern the original location and extent of the Emeryville Shellmound.

It was apparent that the site had gone through a series of changes in shape and apparent size over the later part of the nineteenth century and the first quarter of the twentieth century. It is clear that the present project area lies to the west of the area examined by Schenk in 1924, but it is not clear whether the project area lies outside the area formerly covered by the mound, or if the project area contains spoil deposits from the demolition of the mound and subsequent use as bay fill.²

4.11.2 IMPACTS

The two project scenarios would pose only a small risk of disturbance to the Emeryville Shellmound and other possible cultural resources at the project site. The following discussion applies to both alternatives.

From all available information it is clear that the shoreline of San Francisco Bay in the vicinity of the project area has changed radically since the middle of the nineteenth century. The high tide line formerly to the east of the project site is now to the west. Due to the lack of proper archaeological surveys the boundaries of the Shellmound remain

a mystery. The precise relationship of the project site to the Emeryville Shellmound has not been determined; however, the subsurface evaluation of soil profiles reduced the possibility of the project site being within the immediate vicinity of the Emeryville Shellmound. Since there is still some small possibility that cultural resources are present at the site within the excavation zone, construction of the project could result in a significant impact. On the other hand, this possibility is small, and the mitigation measures below would reduce this potential impact to an insignificant level.

4.11.3 MITIGATION MEASURES

It is recommended that the following mitigations be implemented to minimize impacts to potential cultural resources on the project site.

Despite the findings of the test procedures, a very small possibility exists for the discovery of potentially important historic deposits within the bay mud of the shoreline. Should any indications of deeply buried ship remains, nineteenth century trash deposits or dumps, or other features which appear to be greater than one hundred years of age, be encountered during excavation, all work should be halted in the vicinity of the discovery, and an archaeologist contacted immediately. Although it is considered highly unlikely that any discovers of merit will be made, the potential for important discoveries exists to some degree in all bayshore locations.

In the unlikely event that prehistoric human interments (human burials) are encountered within the native soils of the parcel, all work should be halted in the immediate vicinity of the find. The Native American Heritage Commission, the project superintendent, the Project Sponsor or Owner, the County Coroner, and a representative of any agency granting a permit for the operations being conducted, should be contacted by telephone immediately and advised of the find. Work in the immediate vicinity of the find would be halted. If the encountered human interment(s) cannot be avoided by modification of the project, an appropriate crew of excavators will be brought in by the monitoring archaeologist to remove the discovered remains, if that is the course of action deemed appropriate. These actions should be on approval of the Project Sponsor or Owner, and in concurrence with the County Coroner and the Native American Heritage Commission.

The same notification procedure should be followed if isolated bone or fragments are found which are not associated with other bones, or which lie in an obviously badly disturbed area. The fragments would be removed from the excavation and retained by the archaeologist until such time as disposition was decided.

The same procedure of notification should be followed if significant cultural deposits other than human burials are encountered, with the possible exception that the Native American Heritage Commission need not be contacted if the discovery is not Native American. The Native American Heritage Commission must be contacted in all cases where prehistoric or historic era Native American resources and/or internments are involved.

The purpose of stopping equipment in the vicinity of a find is to decrease the possibility of damaging the find. Consequently, the archaeologist should accomplish the necessary preservation or recording tasks as quickly as possible.

Any stopping of equipment would only involve those pieces of equipment that actually encounter significant or potentially significant remains, and should not be taken to mean a stoppage of all equipment on the site unless the cultural deposit covers the entire site.

¹ An Evaluation of the Potential for Impacts to Archaeological Deposits Within the City of Emeryville, Temescal Creek Improvements, Area I. Prepared by William Roop for Archaeological Resource Service under contract to Kent Watson and Associates, September 1988.

² Schenk, W. Egbert. The Emeryville Shellmound. Final Report. University of California Publications in American Archaeology and Ethnology, V. 23, No. 3, pp. 147-282. University of California, Berkeley. 1926.

³ Ibid.

⁴ Op.cit., Roop.

4.12 POPULATION, EMPLOYMENT AND HOUSING

This section analyzes the effect of the Pilot Plant on population, employment and housing levels within the City of Emeryville and the surrounding region. Increases in population, employment and housing are typically considered beneficial due to the associated increases in personal income and public revenue which strengthens the local economy. Potentially significant environmental effects of population, employment, and housing growth can occur in other environmental areas (traffic, public services, etc), and these are examined in other sections of the EIR.

The proposed project's employment impact would stem directly from the jobs created at the project site. The estimated employment impact is characterized in terms of absolute magnitude, percentage increase over existing levels, and as a share of projected employment growth.

The proposed project would have no direct impacts on population or the housing supply in the City of Emeryville because it includes no residential units. The project would have an indirect impact on population and housing demand, however, as increased employment could increase the demand for local residences.

SETTING

Table 4.12-1 presents the baseline data on population, employment and housing for the City of Emeryville and the North County subarea (Association of Bay Area Governments' subarea) consisting of: Alameda, Albany, Berkeley, Emeryville, Oakland, and Piedmont. The table covers the historical period from 1980 to 1989 and projections for 1990. The Association of Bay Area Governments (ABAG) prepares population, employment and household projections for the nine-county region. The California Department of Finance (DOF) prepares annual estimates of housing units for the cities and counties of California. The DOF's historical data on housing is presented for 1980 and 1988. The subsections below discuss the population, employment and housing data in this table.

According to ABAG estimates, employment within the City of Emeryville increased from approximately 12,325 jobs in 1980 to approximately 14,880 in 1989, an increase of 2,555

TABLE 4.12-1
 BASELINE DATA - POPULATION, EMPLOYMENT AND HOUSING
 IN EMERYVILLE AND NORTH COUNTY

Area	Past 1980	Existing 1989	Projections 1990	Change 1980-1989		Change 1989-1990	
				#	%	#	%
Emeryville ¹							
Employees	12,325	14,880	15,100	2,555	20.7%	220	1.5%
Households	2,132	3,110	3,240	978	45.9%	130	4.2%
Population	3,714	5,290	5,500	1,576	42.4%	210	4.0%
Dwelling Units ²	2,416	3,359	3,464	943	39.0%	105	3.1%
Single-Family	409	470	485	61	14.9%	15	3.2%
Multi-Family	2,007	2,889	2,979	882	43.9%	90	3.1%
Vacant Units	285	373	385	88	30.9%	12	3.2%
North County ^{1,3}							
Employees	291,461	317,960	321,100	26,449	9.1%	3,140	1.0%
Households	225,626	236,598	237,720	10,972	4.9%	1,122	0.5%
Population	535,859	572,310	573,000	36,541	6.8%	1,690	0.3%

¹ Association of Bay Area Governments, Projections '87, July, 1987.

² California Department of Finance, Report E-5, Population and Housing Estimates for California Cities and Counties.

³ North County comprises: Alameda, Albany, Berkeley, Emeryville, Oakland and Piedmont.

Source: EIP Associates, March 1989.

jobs (20.7%) at an annual average rate of 2.3% as shown in Table 4.12-1. ABAG projects an employment level in Emeryville of up to 15,100 by 1990. This would produce an increase of about 220 jobs at a growth rate of 1.5%. This growth rate is slower than the historical period.

Between 1980 and 1989, the number of households in Emeryville increased from 2,132 to 3,110 as indicated in Table 4.12-1. This increase of 978 (45.9%) households represents an average annual rate of 5.1%. ABAG projects the number of households in Emeryville to increase from 3,110 in 1989 to 3,240 in 1990 as shown in Table 4.12-1. This represents an increase of 130 households, a 4.2% increase over current levels.

The DOF estimates showed a low number of single-family units relative to other California communities. Table 4.12-1 shows that in 1980 there were 409 single-family units and in 1989 there were 470, constituting about 14% of the total dwelling units in Emeryville. The large proportion of multi-family units with associated greater transiency may account for Emeryville's relatively high vacancy rate of 11.1% in 1988.

Population within Emeryville increased from 3,714 in 1980 to 5,290 in 1989, representing an increase of 1,576 persons (42.4%) over the period, or approximately 4.7% annually as indicated in Table 4.12-1. ABAG projections for 1990 show Emeryville's population reaching 5,500, a 4.0% increase of 210 persons over existing levels as shown in Table 4.12-1.

Employment levels in the North County increased from 291,461 in 1980 to 317,960 in 1989, representing an increase of 26,499 jobs (9.1%), at an annual average rate of approximately 1.0% as indicated in Table 4.12-1. ABAG projects jobs in the North County to increase to 321,100 in 1990, an increase of 3,140 jobs, 1.0% over existing levels. Table 4.12-1 shows that households within the North County increased from 225,626 in 1980 to 236,598 in 1989. This represents an increase of 10,972 households (4.9%), an average annual rate of 0.5%. According to ABAG projections, households within the North County will increase to 237,720 in 1990, an increase of 1,122 households (0.5%) over existing levels. Population within the North County increased from 535,859 in 1980 to 572,310 in 1989 as indicated in Table 4.12-1. The increase totaled 36,451 persons (6.8%) at an average annual rate of approximately 0.8%. Population within the North County will increase by 1,690 persons (0.3%) to 573,000 in 1990 according to ABAG projections.

IMPACTS

The employment impact of the proposed project is the increase in new jobs created at the project site. The population and housing demand impacts of the proposed project are indirect impacts associated with the increased employment in the City of Emeryville accommodated by the proposed project. The population, employment, and housing impacts of the proposed project are presented in Table 4.12-2.

Employment

The Pilot Plant would employ approximately 82 people as shown in Table 4.12-2. This would represent a 0.5% increase over the existing level of 15,100 jobs at the time of project development shown in Table 4.12-1. Some of the positions would be filled by existing Chiron employees at other locations in Emeryville. The spaces these employees vacate would likely be eventually filled by other new Chiron employees. Therefore, for the purposes of this analysis impacts will be calculated assuming all the 82 employees are new to Emeryville. The 82 jobs from the Pilot Plant would be an insignificant increase in total jobs within the North County.

Housing Demand

The Pilot Plant would accommodate approximately 82 jobs as discussed above. The traffic analysis indicates that 17%, or 14 of the employees at the project site would travel east from the project site to Emeryville or Oakland. The housing impact on Emeryville from this development would be relatively small and could be accommodated by the 105 new units projected for Emeryville in 1990. The 82 new households listed in Table 4.12-2 would represent an insignificant percentage of the total households in the North County in 1990. They would utilize approximately 7% of the projected increase in dwelling units for the North County listed in Table 4.12-1. As discussed above, however, not all project employees would be expected to choose residences within the North County.

Population

The Pilot Plant would generate 14 new households in Emeryville and Oakland and result in an increase of 34 persons as indicated in Table 4.12-2. The 82 total new households would generate 197 new residents in the North County, representing an insignificant percentage of both the projected total population in 1990 and the percentage increase over current levels.

TABLE 4.12-2
EMPLOYMENT, HOUSING AND POPULATION IMPACTS OF THE PROJECT

	<u>Pilot Plant</u>	<u>% Increase Over Existing Levels at Time of Development</u>
Emeryville ¹		
Employees ²	82	0.5%
Housing Demand ³	14	0.5%
Population ⁴	34	0.6%
North County ⁵		
Employees	82	*
Housing Demand	82	*
Population	197	*

¹Based on traffic analysis in Section 4.3 that shows 17% of project employees traveling to Emeryville and Oakland.

²EIP Associates. Based on Chiron estimates of transferred and new employees.

³EIP Associates. Housing demand factor of 1 household per employee.

⁴ABAG, Projections '87, July, 1987. Persons per household factor of 2.4 projected for North County in 1990.

⁵North County comprises: Alameda, Albany, Berkeley, Emeryville, Oakland and Piedmont.

* Less than 0.1% (insignificant).

Source: EIP Associates.

MITIGATION MEASURES

As discussed above, increases in population, employment and housing are typically considered beneficial and would not require mitigation measures. Therefore, no mitigation measures are required or suggested.

4.13 PUBLIC SERVICES

SETTING

Fire¹

The Emeryville Fire Department provides fire protection to the project site. Engine #2 located at 6303 Hollis Street would be the first to respond to emergencies at the project site, with a response time of between three to five minutes. The second unit that could respond is based in the Department's Station located at 4331 San Pablo in Emeryville.

The Hollis Street Station is equipped with an engine company, a truck, and an equipment van. A force of four firefighting personnel operates the station.

Police²

The Emeryville Police Department provides police protection to the project site. Response time from the police station located at 2449 Powell Street is less than one minute. A force of four police personnel serves the City.

Schools³

The Emeryville Unified School District (EUSD) serves the vicinity of the proposed project. The District operates the Anna Yates Elementary School for grades K-6, and Emery High School accommodates grades 7-12. Enrollment at Anna Yates Elementary stands at 280 students in a building with a capacity of 300 students. Emery High School has a current enrollment of 235 students and a capacity of 350 students. The District also owns the Ralph Hawley School site that has a capacity of 200 students. The District currently rents the site to a private school.

Enrollment trends for the District show an increase in students during the past five years. This trend is expected to continue. District enrollment for grades K-8 is larger than at any time during the last ten years. The need for capacity is anticipated to increase as these students progress to high school and an equally large body of students enroll in the elementary grades. Under AB 2926, school districts may impose a fee of up to \$1.53 per square foot of new residential development, and \$0.25 per square foot of new commercial

development including hotels, to offset the cost of providing additional school facilities. The Emeryville Unified School District does not have such a developer impact fee.

Maintenance of Public Facilities⁴

The Public Works Department provides maintenance of public facilities in the City of Emeryville. Street maintenance is the largest component of public facilities maintenance costs. The Department contracts out most of the street maintenance work to private firms. Last year (1987-1988) the Department spent approximately \$26,000 to maintain 18 miles of streets, at an average cost of approximately \$1,444 per mile.

IMPACTS

Fire

The Emeryville Fire Department would provide fire protection to the proposed project. The Department could serve the proposed project with existing personnel and equipment if the project is constructed to meet applicable fire protection requirements (see Mitigation Measures below).

Police

The Police Department could adequately serve the proposed project with existing personnel and equipment provided that mitigation measures are implemented.

Schools

The Emeryville Unified School District has a total surplus capacity of 135 spaces in its currently open schools, and an additional 200 spaces at the Ralph Hawley School site.

The proposed project would not directly generate new students for the District, because it includes no residential units. There could, however, be a secondary impact on the District through increases in associated employment. This impact could occur in one of two ways: future employees become residents within District boundaries, or future, non-resident employees request that the District enroll their children under provisions of California Assembly Bill 2071. AB 2071 requires the District to enroll the children of non-resident employees if sufficient capacity is available at schools within the District.

Impacts from the first case (future employees residing within the District) will be examined for the Pilot Plant. The traffic analysis in Section 4.3 estimated that approximately 17% of project employees would travel east to Emeryville or Oakland. This analysis uses a worst case scenario that all 17% of these employees would live within the EUSD and that each new employee creates a new household.

The two office building development would accommodate 50 new employees as discussed in Section 4.12, Population, Employment, and Housing. Approximately 14 of these employees would live within the EUSD using the assumptions discussed above. The 14 new households would result in approximately 6 new students using the student-per-household factor of 0.46 for Alameda County.⁵ The District could accommodate the 6 new students resulting from the Pilot Plant development with its existing facilities.

Maintenance of Public Facilities

The City of Emeryville Public Works Department would provide maintenance to streets and other public facilities at the project site. The Public Works Department could provide maintenance to the public facilities at the project site with its existing personnel and resources. The applicant has agreed to upgrade the public streets in the vicinity of the proposed project subject to reimbursement from a to-be-formed assessment District, which should reduce future maintenance costs below current levels.

MITIGATION MEASURES

Fire

The following mitigation measures should be included as conditions for project approval:

- o The applicant should comply with all regulations set forth by the Fire Department.
- o Agreements made between the Fire Department and the applicant regarding access routes, spacing of fire hydrants, and pressure requirements that conform to the 1985 Uniform Fire Code should be implemented.
- o No exterior overhanging facades or canopy should be used unless tied in as part of the supporting structure and incorporated with fire stops as per Fire Department requirements.
- o Stand pipes for connection to fire hoses should be located in all stairwells in the project.

Police

The following mitigation measures are required for approval of the proposed project.

- o The applicant shall comply with all regulations set forth by the Police Department.
- o The applicant shall obtain Police Department approval of all personal and public safety equipment installed by the applicant. Items subject to review shall include, but not be limited to, security hardware, exterior lighting and alarm systems.

Schools

No mitigation measures would be required.

Maintenance of Public Facilities

No mitigation measures would be required.

¹Jim Eversole, Fire Marshall, Emeryville Fire Department, personal communication, January 9, 1989.

²Officer Nunley, Emeryville Policy Department, personal communication, January 9, 1989.

³Dr. Peter Corona, Superintendent, Emeryville Unified School District, personal communication, January 10, 1989.

⁴Wally Kolb, Director of Public Works, City of Emeryville, personal communication, January 10, 1989.

⁵United States Census, 1980.

5. CEQA CONSIDERATIONS

5.1 CUMULATIVE IMPACTS

The California Environmental Quality Act (CEQA) requires consideration in an EIR of impacts which are individually limited but cumulatively considerable. "Cumulatively considerable" refers to the incremental effects of an individual project which are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.

In addition, Section 15130(b)(1) of the State CEQA Guidelines requires EIR's to include an assessment of future projects which would contribute to a cumulative effect. This can be done by compiling a list of past, present, and reasonably anticipated future projects which might have related or cumulative impacts.

Cumulative Effects of Biotechnology

Table 5-1 identifies biotechnology research and manufacturing facilities currently operating in Emeryville, Berkeley and Oakland. Apart from the proposed Chiron facility, no other applications for new biotechnology facilities are currently being considered by any of the three cities. However, Miles Laboratories/Cutter Biological Division is planning an expansion and partial renovation of its current facilities in Berkeley. The following discussion assesses the cumulative effects of the proposed facility in combination with the existing biotechnology facilities.

A concentration of several biotechnology facilities in a given area would increase the probability of an accident at a biotechnology facility in that area. However, the consequences of an accident at the proposed Chiron facility would be no more severe than might be expected at a similar small manufacturing plant that handles hazardous materials. Because of the nature of the microbial organisms used at the Chiron facility,

TABLE 5-1
BIOTECHNOLOGY RESEARCH AND MANUFACTURING COMPANIES
(Emeryville, Berkeley, Oakland)

<u>Location</u>	<u>Description of Operations</u>
EMERYVILLE	
Cetus Corporation	Recombinant DNA therapeutic proteins, such as IL-2 and interferon and other cytokines, diagnostic kits, Pro-Pette System, generic chemotherapy drugs. Technologies: recombinant DNA, fermentation, lab scale purification, hybridoma/cell fusion, large scale purification, synthesis, sequencing enzymology, cell/tissue culture, process monitoring control, separations
Chiron Corporation	Recombinant DNA, fermentation, hybridoma/cell fusion, medical diagnostics and therapeutics
Lucky Biotech Corp.	Hepatitis B diagnostics and vaccine, beta and gamma interferon, animal growth hormones, other rDNA research
Medi-Physics	Radiopharmaceuticals for diagnostics
BERKELEY	
Berkeley Biologicals	Assembly of allergenic extracts into finished product
Miles Laboratories/Cutter	
Biologicals Division	rDNA research for plasma proteins, large scale purification of plasma enzymes and proteins, variety of biomedical products
Northview Pacific Laboratories, Inc.	Cell/tissue culture
The Peptide Laboratory	Lab scale purification, separations, synthesis, large-scale purification, custom and synthetic peptide production
Research and Diagnostic Antibodies	Immunoassay kits, custom antibody service
OAKLAND	
Advanced Genetic Sciences, Inc.	Genetic engineering of plants to improve crop yield, resistance to pests, hybrid breeding technology, use of engineered Rhizobacteria for disease control and growth enhancement. First commercial ice-nucleating product, Snomax; developing frost-preventing bacteria, Frostban

the escape to the sewer system or the atmosphere of these organisms as a result of a catastrophic accident would not be expected to threaten public health or the environment.

Traffic

The proposed Pilot Plant would contribute to significant cumulative traffic impacts in the Powell Street area. This is outlined more specifically in Section 4.3, Transportation, of this document. The baseline and future traffic volume estimates used in that analysis include estimated traffic volumes for growth throughout the area affected by the proposed project. The roadway alternatives outlined in Section 4.3 would partially mitigate the cumulative traffic impacts.

Air Quality

Criteria pollutant emissions are strictly regulated under the policies of the Bay Area Air Quality Maintenance Plan. Emissions of criteria pollutants from traffic associated with the proposed Pilot Plant would exacerbate an existing local problem with carbon monoxide levels. The area around the proposed site is currently in non-compliance for carbon monoxide levels that make any addition of carbon monoxide a significant impact.

Emissions from biotechnology facilities of non-criteria pollutants could have a cumulative impact on air quality. Non-criteria, toxic air emissions could introduce contaminants not addressed by current regulations and further exacerbate cumulative air quality problems. Maintenance of all biotechnology facilities in compliance with permit standards would facilitate reductions in non-criteria pollutant cumulative air quality impacts to less than significant levels.

Water Quality

The cumulative effect of run-off from paved surfaces in the proposed project and other land uses in the area of the project site and Temescal Creek would contribute to a cumulative degradation of the water quality of the Creek and, subsequently, the Emeryville Crescent. One of the buildings which is planned within the drainage area of the Temescal Creek includes the Shellmound Park development proposed to the north of the project site. A part of that project would be to partially restore the Creek in that area with one of four plans being considered. This would partially mitigate this cumulative impact.

If biotechnology facilities were constructed without adequate pre-treatment programs, i.e., in violation of East Bay Municipal Water District requirements, the cumulative effect of facility wastewater discharges in conjunction with other industrial discharges could contribute to a cumulative degradation of wastewater quality being discharged to the wastewater treatment facility. This in turn could increase the risk of breakdowns and malfunctions of the wastewater treatment plant. Conforming to and monitoring and enforcement of the pre-treatment program would reduce this cumulative effect to less than significant levels.

Cumulative Construction Impacts

If the construction schedule of the proposed project coincides with construction of other pending projects, there could be cumulative impacts in air quality (dust), noise and traffic (construction-related traffic).

MITIGATION MEASURES

The adverse environmental effects of growth in the City of Emeryville could be lessened by the implementation of certain mitigation measures. Implementation of some of these mitigation measures is outside the scope of the City of Emeryville's authority. Mitigation measures could include:

- o City and County adoption of general plans and zoning ordinances that favor high density development and urban in-filling to reduce the consumption of open land and wildlife habitat;
- o imposition of more stringent vehicular and stationary source air pollutant controls;
- o transportation system management (TSM) measures including encouragement of car- and vanpooling, providing of parking lots at transit stops, provision of exclusion carpool and bus lanes, etc.;
- o support by the City of efforts to coordinate infrastructure and land use planning on County and regional levels.

5.2 GROWTH-INDUCING IMPACTS

Section 15126(g) of the CEQA Guidelines requires a discussion of the ways in which the proposed project could be growth-inducing. A project is generally considered to be growth inducing if it meets any one of the following criteria: extension of urban services into a

previously unserved or underserved area; extension of a major transportation corridor into a previously unserved or underserved area; or removal of a major obstacle to housing development and growth. Inducement of disorderly growth generally causes significant adverse environmental impacts.

A project is generally considered to be growth-inducing if it meets any one of the following criteria: extends urban services into a previously unserved or underserved area, extends a major transportation corridor into a previously unserved or underserved area, or removes a major obstacle to housing development and growth. Inducement of disorderly growth generally causes significant adverse environmental impacts.

The proposed project would meet none of these criteria and consequently is not considered growth-inducing. Development of the project does not require extension of transportation corridors or urban services to an underserved area and would add only 82 employees. It would not have a major effect on housing development and would not result in the removal of obstacles to growth.

5.3 SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

This section identifies impacts that could not be eliminated or reduced to a non-significant level by mitigation measures included as part of the project or other mitigation measures that could be implemented.

The California Environmental Quality Act (CEQA) includes a provision for identifying unavoidable adverse impacts:

15126(b) Any Significant Environmental Effects Which Cannot Be Avoided if the Proposal is Implemented. Describe any significant impacts, including those which can be mitigated but not reduced to a level of insignificance. Where there are impacts that cannot be alleviated without imposing an alternative design, their implications and the reasons why the project is being proposed, notwithstanding their effect, should be described.

The analysis provided in Chapter 4 shows that both traffic and air quality impacts would be significant and unavoidable.

6. PROJECT ALTERNATIVES

The California Environmental Quality Act (CEQA) requires EIRs to "describe a range of reasonable alternatives to the project or to the location of the project, which could possibly attain the basic objectives of the project and evaluate the comparative merits of the project" (CEQA Guidelines, Section 15126 (d)).

For the purpose of this EIR alternatives analysis, the basic intent of the Chiron Pilot Plant project is to develop a manufacturing facility for clinical-trial and low-volume commercial quantities of various biotechnology products at a location close to the existing Chiron offices and research and development laboratories in Emeryville.

The alternatives to the development of the proposed Chiron Pilot Plant considered in this chapter include: 1) the no-project alternative; 2) development of a Pilot Plant at full-buildout allowable under current zoning; 3) the development of the proposed Pilot Plant at alternate sites; and 4) development of an office building on the project site as an alternative use for the site.

6.1 NO PROJECT ALTERNATIVE

DESCRIPTION

The No Project alternative would eliminate construction of the proposed pilot plant altogether. It would mean that the project site would remain undeveloped.

IMPACTS

The No Project alternative would eliminate potential negative environmental impacts associated with the project. No new traffic would be created in the project vicinity associated with the Pilot Plant and corresponding air quality impacts would be avoided. Therefore, no significant unavoidable impacts would occur. Also, potential economic benefits to the area and improvement of the visual quality of the site would not occur.

COMPARISON WITH PROPOSED PROJECT

Under this alternative, the Chiron Corporation would continue operations in its existing locations only. Chiron's goal of establishing a pilot manufacturing plant would not be attained. The site would retain its full development potential and another project of up to 149,500 square feet of commercial/industrial development could be built.

6.2 FULL BUILDOUT ALTERNATIVE

DESCRIPTION

Zoning at the proposed project site allows for a 1.3:1 Floor Area Ratio (FAR). Under maximum buildout, the 2.64 acre (about 115,000 square feet) project site could support a development of approximately 149,500 square feet (sq. ft.). The proposed project includes 101,700 sq.ft. and the maximum buildout alternative therefore would increase the project size by 47,800 sq. ft. or 47 percent.

IMPACTS

The full-buildout alternative would add about 34 employees to the currently projected number of 82. Expansion of the building would increase operational activities and therefore increase the potential for accidental release of hazardous substances. Other impacts, including air quality and traffic impacts, would increase in proportion to the larger facility size, but would still be considered less than significant after mitigation. While the greater number of employees under the full buildout alternative would create increased demand for housing and public services in Emeryville, these impacts would remain at a less than significant level.

COMPARISON WITH PROPOSED PROJECT

The full-buildout alternative is not necessary to achieve Chiron's goals for small-scale biotechnology manufacturing capability near its Emeryville offices. While Chiron may eventually desire expanded capabilities, larger scale production plants would be pursued in other locations and would be subject to further environmental review.

6.3 ALTERNATIVE SITE LOCATIONS

DESCRIPTION

Prior to selecting the presently proposed Chiron Pilot Plant Site, the Chiron Corporation considered several locations for facility development. Figure 6-1 in this EIR shows the location of these sites. The alternate sites are identified as follows:

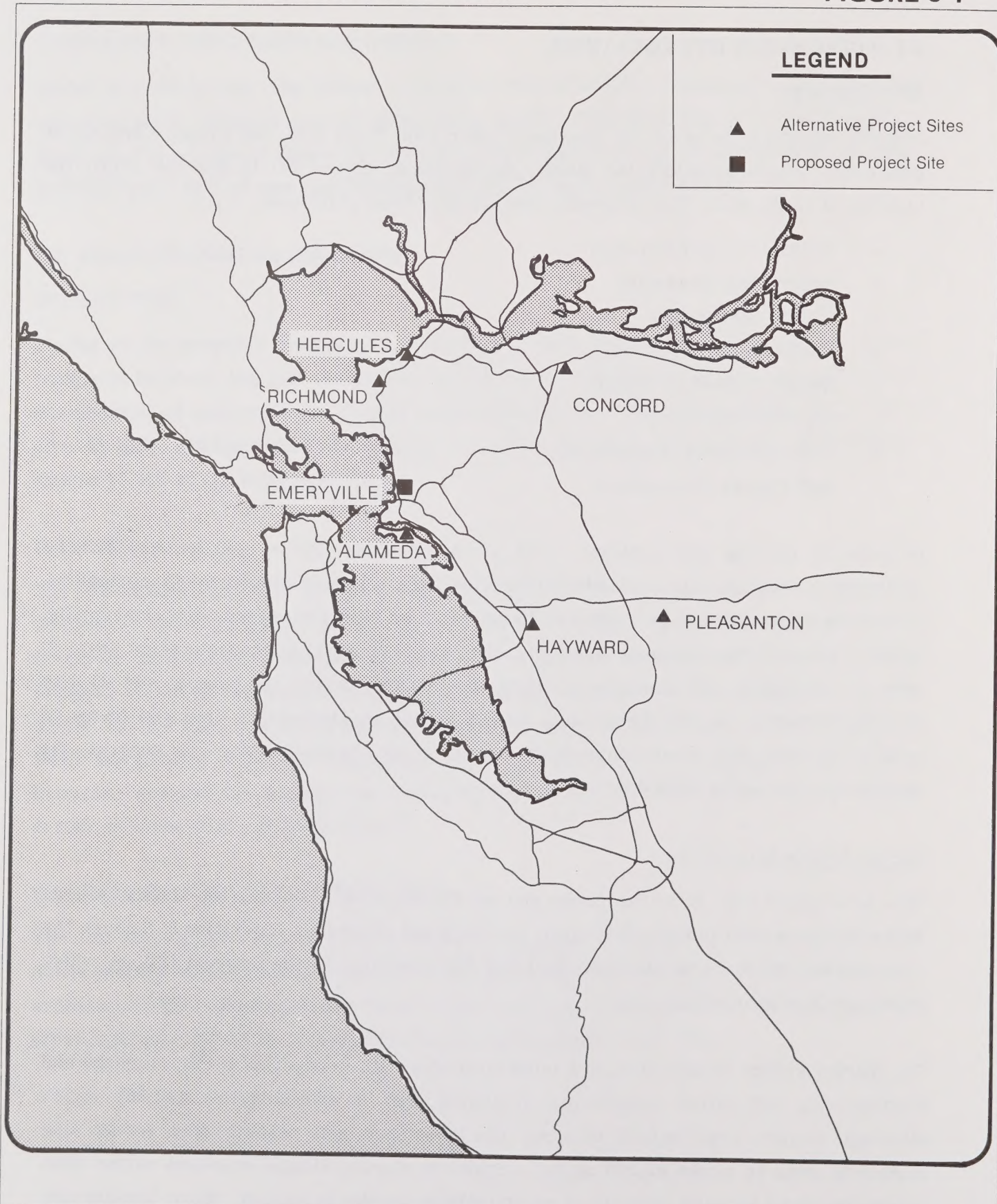
- o Marina Village (Alameda)
- o Harbor Bay (Alameda)
- o Hilltop (Richmond)
- o North Shore (Hercules)
- o North Concord (Concord)
- o Sky Park (Hayward)
- o Hacienda Lakes (Pleasanton)
- o Koll Center (Pleasanton)

In order to develop and evaluate these alternate sites, Chiron used general criteria including: 1) local government and community attitudes toward biotechnology companies, 2) freeway access, and 3) 30 to 40 minute driving time from Chiron offices in Emeryville. Specific criteria for the plant itself included: 1) sufficient developable floor area, 2) parking availability, 3) adequate utilities, particularly water and sewer, and 4) site security. Chiron's second choice site, Marina Village in Alameda, is discussed below to provide an indication of environmental impacts at an alternative site. In general, the impacts at alternative sites would be similar.

Marina Village Alternative

This alternative site is in the north end of the City of Alameda, off Marina Village Parkway. Access to the site from area freeways and other East Bay cities is through the Alameda Tunnel (Webster Avenue). Highway 880 runs close to the Oakland Estuary which separates Oakland and Alameda.

The Marina Village development is a mixed-use area with residential, retail, research and development, and office components. Available area is approximately 120,000 sq.ft., although current negotiations between the developer and tenants may reduce the remaining area to about 62,000 sq.ft.¹ Space in Marina Village is leased rather than purchased, and a tenant's capacity to expand within the site is limited. Major tenants now



include Relational Technology and Hana Biologics, a biotechnology firm with an approximate staff size of 130. Other biotechnology firms located in Alameda include: Kabi Vitrum, a human pharmaceutical and intravenous nutrition products firm with a staff size of 50; Triton Biosciences, Inc., a subsidiary of Shell Oil with a staff of about 150, which produces therapeutics for cancer and serious viral diseases; diagnostics for performing sophisticated immunoassays in large hospital and reference labs; and In-Site Vision with a staff size of about 15.

IMPACTS

The Marina Village alternative site does not present a clear-cut advantage over the proposed Pilot Plant site with regards to environmental impacts. Development of a pilot plant at Marina Village would avoid the localized impacts discussed in this EIR associated with the proposed Emeryville site, principally the effect on traffic. Such an action would replace the potential occurrence of adverse effects at the proposed site with other site-specific environmental effects at the alternate site. Similarly, potential beneficial impacts of the proposed development, such as additions to the local economic base, would be relocated.

Development of a pilot plant at the Marina Village alternative site would produce similar cumulative impacts related to biotechnology operations in Alameda because Alameda, like Emeryville, is a center for the industry. Specifically, Hana Biologics in Marina Village performs processes similar to those of the proposed project.

COMPARISON WITH PROPOSED PROJECT

Chiron's overriding consideration when determining the project site location was proximity to existing Chiron facilities. Some alternate sites offered significant benefits, such as lower development cost, but were decided against on the basis of distance. Of all sites examined, the proposed project site is nearest to Chiron's Emeryville offices. Marina Village is the next closest, at about 12 to 15 minutes average driving time from Chiron's offices. In comparison, the proposed project site is five minutes travel time from Chiron. Freeway access at the proposed project site is particularly good, whereas the Alameda site's freeway access would be considerably less convenient. This would be complicated by an intensification of the already congested "Webster tube" which connects the Island of Alameda to Oakland on the Island's northern end.

6.4 OFFICE BUILDING ALTERNATIVE

DESCRIPTION

This alternative involves substitution of an office building of equal area for the proposed Pilot Plant. The 101,700 sq. ft. office building would house 356 employees at full occupancy, an increase of 274 (330 percent) over the proposed project. A three-story structure would be constructed in place of a partially two-story and partially three-story pilot plant with a mechanical penthouse. The alternative project would have approximately equal height (67 feet).

IMPACTS

Under this alternative, the creation of employment in the area would be a significant beneficial impact. The addition of a large number of employees would, however, increase traffic impacts due to the increased number of employees. As discussed in Section 4.2, Transportation, Powell Street already suffers congestion and cumulative impacts from other development which will worsen in the future. Criteria pollutant air quality impacts would increase under this alternative.

COMPARISON WITH PROPOSED PROJECT

The office building alternative would create more serious environmental impacts than would development of the proposed Pilot Plant. Although potential exposure to hazardous substances at the site would not be an impact of the building alternative, effects on traffic would be greater. Both the office alternative and the proposed Pilot Plant would create local employment. Chiron's small-scale manufacturing facility goal would not be achieved under the office building alternative.

¹ Bill Walsh, Senior Sales Consultant, Coldwell Banker, per verbal communication of March 6, 1989.

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